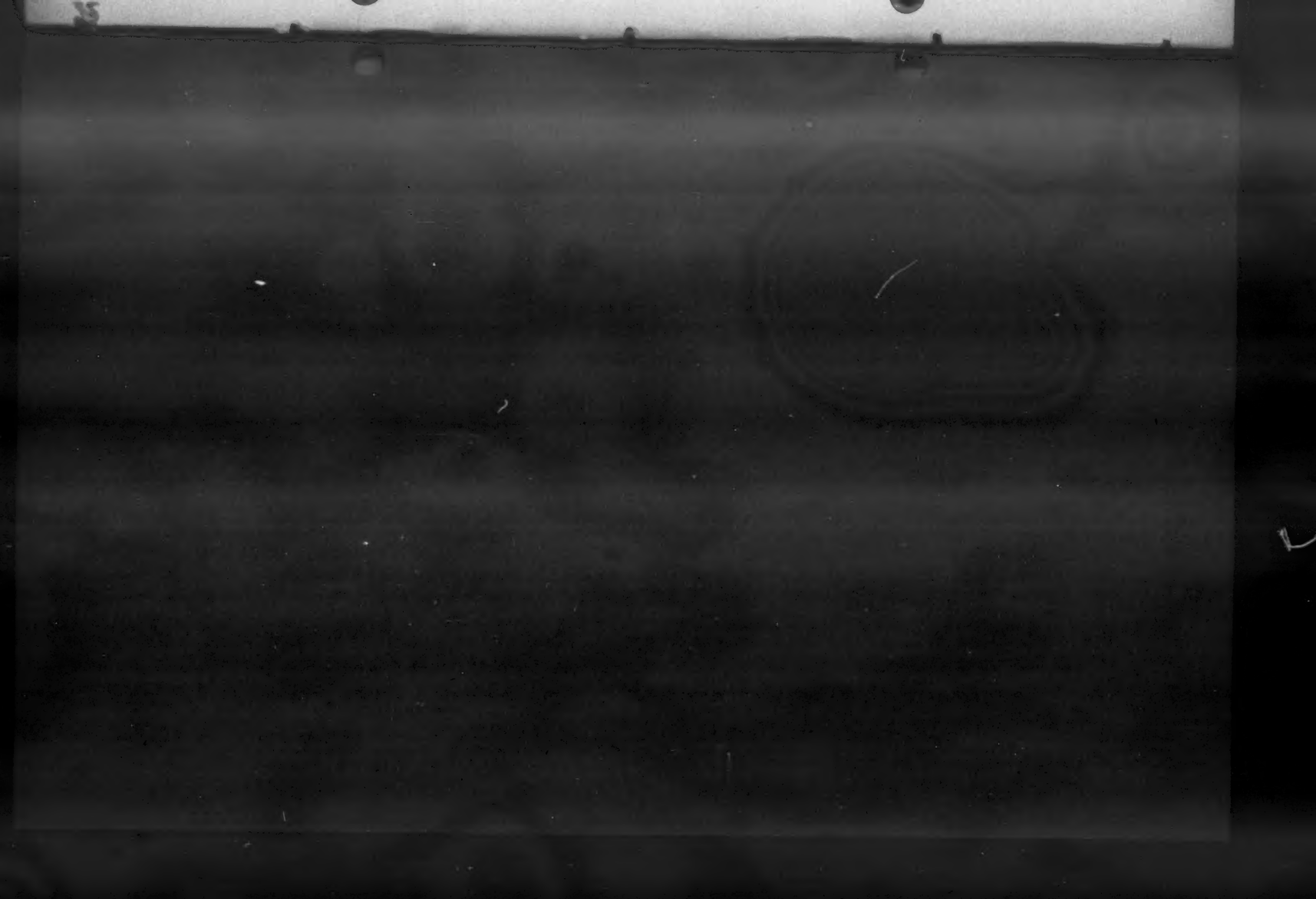
AMERICAN GAS ASSOCIATION MONTHLY

Vol. V No. 6

JUNE, 1923

"It appears to me that little more than common sense and common honesty, in the transactions of the community at large, would be necessary to make us a great and happy nation."

—WASHINGTON



CONTENTS

VOLUME V JUNE, 1923 NUMBER 6

Associations Affiliated with A. G. A. 336
Cereal Drying Indirectly with Gas Heated Air 374
Classified Directory—Manufacturers of Gas Equipment 350
Conditioning of Silk by Indirect Gas Heated Air 373
Conditioning Silk and Textiles by Indirect Gas Heated Air 375
Construction Budget 328
Effective Salesmanship Lies in Service 371
Employment Bureau 384
Free Supply of Slogan Strips 348
Fifty Years Ago 323
Mr. Gadsden A Director of National Chamber of Commerce 324
Gas Company Shows Initiative 325
Gas Fuel for Stereotype Furnaces 376
I Serve, Editorial 322
Information Cards for the Employee 346
Magazine Publicity 345
National Chamber Endorses State Regulation 327
New Members 339
"Not Interested" Says Mr. Hearst 335
Public and Public Utilities, The 326
Quality Merchandise Again 349
Story of What a B.t.u. Should Be to You, The 340
Tentative Specifications for Gas and Coke Coals 381
Thermal Operation of Modern Regenerator Coke Ovens 377
Value of the Right Personnel in Customer Service, The 337
Why Public Utilities Should Advertise 341

AUTHORS

Clark, Walton, "Fifty Years Ago" 323
Davidson, H. C. "Construction Budget" 328
Forrest, H. O., C. H. Herty, Jr., D. W. Wilson "Thermal Operation of Modern Regenerator Coke Ovens" 377
Herty, C. H., Jr., H. O. Forrest, D. W. Wilson, "Thermal Operation of Modern Regenerator Coke Ovens" 377
Short, Arthur F. "Information Cards for the Employee" 346
Stoecker, Louis "The Value of the Right Personnel in Customer Service" 337
Strandborg, W. P., "Why Public Utilities Should Advertise" 341
Wilson, D. W., H. O. Forrest, C. H. Herty, Jr., "Thermal Operation of Modern Regenerator Coke Ovens" 377

FOR STATEMENTS AND OPINIONS CONTAINED IN PAPERS AND DISCUSSIONS APPEARING HEREIN, THE ASSOCIATION DOES NOT HOLD ITSELF RESPONSIBLE

AMERICAN GAS ASSOCIATION MONTHLY
342 MADISON AVENUE, NEW YORK, N. Y.
SUBSCRIPTION RATE *$3.00 PER YEAR*

Entered as Second Class Mail Matter at the Post Office at Brattleboro, Vermont, February 10th, 1922, under the Act of March 3, 1879.

American Gas Association Monthly

Vol. V JUNE, 1923 No. 6

I Serve

Over six hundred years ago Edward, the Black Prince, was first called the Prince of Wales; since then the eldest surviving son of the King of England has been created Prince of Wales by the King.

Following the custom of those chivalrous and romantic days the first Prince of Wales assumed the crest or badge of three ostrich plumes—so familiar to all of us—together with the motto, "I Serve." And this device has been adopted by each of his successors.

Not only has it been adopted, but it has been lived up to. In our own generation the late King Edward VII is probably better remembered for the Entente Cordiale and the maintenance of international peace when Prince of Wales rather than for his successful reign as a powerful sovereign.

And the present Prince of Wales has endeared himself to most of the nations and has found a particularly warm spot in the hearts of America by his winning personality and charming democracy. He has, in effect, been a special ambassador to the world and his service to his nation has been of the highest order—and right truly have he and his grandfather lived up to their old motto—"I Serve."

In our own country, the greatest democracy of the world, not only the army and the navy but every individual holder of public office, federal, state or municipal takes upon himself the solemn obligation "I Serve."

And in our industry, from President to yard man, this same motto is applicable—especially applicable.

The very foundation and heart of our industry is SERVICE from morning to night, all through the night, and every day in the year, year after year, without ceasing.

An earnest attempt to imbue every individual employee with the inner meaning and spirit of that old motto—"I Serve"—will harvest innumerable benefits in better and more pleasant public relations, a more satisfied public, and a greater industry.

AMERICAN
GAS ASSOCIATION
MONTHLY

Vol. V JUNE, 1923 No. 6

Fifty Years Ago*

WALTON CLARK, Vice-President, United Gas Improvement Company, Philadelphia, Pa.

It is right that I should foregather with the Southern gas men. Truly I am of them. I believe that my date of entry into the gas business in the South is earlier than that of any man here present. Fifty years ago, in 1873, I went into the New Orleans Gas Works as a boy, and I stayed there 15 years. I think you will agree that this identifies me with the gas business of the South and makes good my claim to be one with you.

Fifty years is a long period in any industry. It covers practically all the profound changes that have ocurred in methods of manufacture, methods of distribution, methods of approach to consumers, in *our* industry. When I entered the gas business, gas was made, purified, metered, sold and used practically as it had been for the previous fifty years. Important materials and appliances now available were then unknown.

In the New Orleans Gas Works, the largest in the South in 1873, were settings of five horizontal retorts, hand-fired mud-sealed, producing from Pennsylvania coal 8,000 feet to the mouthpiece and 25,000 feet to the man per day when we were lucky. That was before coal was discovered in Alabama. Occasionally, to help out the illuminating power, in times of festivity such as the Mardi Gras season, resin or cannel coal from Scotland was used for enriching. Generally, we were pretty well satisfied to distribute gas of 16½ candle power. We did not know its heating power, and as a matter of fact, never thought of it. I knew of only one gas stove in the city of New Orleans at that time and that was a crude affair of English make in the house of the general superintendent of the gas company.

Gas was universally purified with slacked lime. It was about this time that Theobald Forstall brought out his epoch-making paper on the preparation of lime for the purification of gas. That paper was a classic.

The South—always well abreast of the

*An address before the Southern Gas Association, St. Petersburg, Fla., 1923.

best in the practice of our art—had many men of note in the industry fifty years ago. That was the day of George F. Hookey, of Augusta; of John McIlhenny, of Columbia; of Theobald Forstall, of New Orleans; of Thomas Turner, of Charleston; of F. Beck, of Galveston; of C. P. Russell, of Houston; of Fish, of Mobile; of McIlhenny, of Montgomery; of John H. Knowles, of Richmond. These and many others whose names are dear to me have laid down the burden of their mortality and passed to their reward.

Fifty years ago! If you would realize how far back that is in the history of our industry, let me tell you that it was before W. B. Mills was superintendent of the Montgomery Gas Company, before Joseph Armstrong was superintendent of the Athens Gas Company, before William Helm was engineer of the Atlanta Gas Light Company, before Arthur Boardman was an officer of the Macon Gas Company, before Hambleton and Dietrich went into the industry in Baltimore, before W. G. Abel went to Chattanooga, before Fred Egner had charge of the Norfolk Gas Works, ten years before Charley Zeek ever saw Pensacola.

If you can imagine what a gas company would be without water gas, without waste heat boilers, without vertical retorts, without silica material, without coke ovens, without regenerative benches, without oxide purification, without ammonia utilization, without a heating load, without prepayment meters, without the Welsbach mantle, without naphthalene trouble, technical graduates, and commissions, without electric competition, and without the Southern Gas Association,—if you can imagine all this, you can understand what was the gas industry of the South when I enlisted for life under Theobald Forstall in the ranks which each of you has since joined.

Do not gather from what I have said that the men, Southern and Northern, who were in the industry when I entered it fifty years ago were other than intelligent and progressive. My generation and yours have built on the foundations that they intelligently and painstakingly had established. If the superstructure is more beautiful than the foundation, none the less the superstructure were impossible without the foundation.

In the language of an obscure rhymester, these foundation builders, these pathfinders, "broke the way when the way was rough." It is becoming in men of our generations, yours and mine, to give occasional thought to the pioneers of our industry, without whose work ours had been impossible. Honor is their due.

Mr. Gadsden a Director of National Chamber of Commerce

Philip H. Gadsden, of Philadelphia, was elected a director of the Chamber of Commerce of the United States at its eleventh annual convention in New York City on May 8 to 10.

Mr. Gadsden is Vice-President of the United Gas Improvement Company, President of the Eastern States Gas Conference, a member of the Executive Board of the American Gas Association and Vice-President and Director of the Philadelphia Chamber of Commerce. He has also served as President of the American Electric Railway Association and the Southern Gas Association.

Gas Company Shows Initiative

This is an editorial which appeared in the Atlantic City Gazette immediately following the regrettable accident at the Atlantic City Gas Company's plant. We reprint it because we believe it is a striking example. There has never been anything like it before as far as we know! (EDITOR'S NOTE.)

PEOPLE never fully appreciate the convenience and advantage of a public utility until they are suddenly deprived of the service in business or domestic life. Take gas for an example; at any hour of the day or night you can have instant heat for commercial purposes, or for cooking, by the simple action of turning on the fluid and lighting it. In the good old days when only stoves or open fireplaces were known, the making of a fire meant the expenditure of not a little time and trouble and hard work.

Now for a day or two we have had to get along the best way we can without our usual supply of gas. The explosion at the Atlantic City Gas Company manufacturing plant on Sunday worked great havoc and put the machinery altogether out of commission, emphasizing in a very realistic way the point we are making. The hotels, and homes, and business places throughout the city and in adjacent communities served by the company, found themselves in a position yesterday morning where the exercise of a little ingenuity was necessary in order to prepare meals and follow the day's routine. It was borne in upon those directly concerned how much they have come to rely upon that very valuable utility in the course of modern existence.

The accident was the first in the history of the company now operating the gas plant. In a long period of progress they have been enabled to serve the patrons, now numbering many thousands, and have built up the system so that they are highly valued colleagues in the discharge of the day's duties. Realizing how much the public depends upon them for service, the gas company management showed very commendable initiative and resourcefulness in preparing immediately after the deplorable accident to resume service. Following a survey of the still smoking ruins of the plant which has cost approximately $1,000,000 to outfit, Manager Geist hired men right and left and got them busy clearing away the debris to make it possible to ascertain just what would have to be done to repair the damage.

At the first glance the task seemed one for a Hercules, but the difficulty and the unusually hard work did not discourage anyone connected with the staff and they toiled throughout the long night and all day yesterday, aided by gas experts from the U. G. I. in Philadelphia, whose services were secured by Mr. Geist within a few minutes after he received a report of the accident. No time was wasted in a study of the cause of the explosion, but every minute was given to getting ready to resume service so as not to discommode the patrons or cause them to suffer discomfort or lose business.

This effort to refit the damaged plant within the shortest possible time and to fulfill the company's obligation to the public under its franchise merits the thanks of the thousands of people who are numbered among the consumers. They will appreciate this the more today, when, if nothing else prevents, they will be served just as usual.

"The Public and Public Utilities"

Another editorial worth reading. This is from The Boston News Bureau and was reprinted in The Wall Street Journal, May 11, 1923. (EDITOR'S NOTE.)

THE MAYOR of Toledo the other day hammered home a few important facts as to what makes a successful street car system. "A city transportation system must be a monopoly," he said, and "Jitney competition with electric cars must stop." What the mayor said may be applied to every form of utility. The prosperity of every community and of the United States as a whole depends very largely on prosperity of our public utilities. They will not prosper unless a spirit of mutual goodwill and tolerance is developed between them, for if the public is dependent upon the utility for service, the utility is dependent upon the public for capital. And one thing the public must learn is that a monopoly is not necessarily a predatory monster or a sinister menace to the general welfare.

Men who invest in ordinary business are quite at liberty to sell their goods when, where, and for what they please. They may shut up shop when they choose. But when men go into such public utility enterprises, as telephone, electric light, heat and power, gas, waterworks, transportation, they do not possess the liberties as to when, where and what that the ordinary business man has. The public utilities come under public regulation; and the general public ought to see that it is to the interest of the general welfare that regulatory bodies should not merely look after such matters as limitation of earnings but should also guarantee such a fair return that investors will promptly supply the capital that shall enable the utility to continue rendering its service.

Few subjects are more befogged than this, and few ought to be more clearly understood. For the whole public has a stake both in the service a utility furnishes and in the capital it uses. More than 1,500,000 citizens have put their savings into electric light and power companies. The great insurance companies have invested many millions in the same securities. And the 29,000 banks of the country have placed $1,700,000,000 belonging to 27,000,000 depositors in these same investments. Few citizens are not directly or indirectly stockholders at least in one utility. As the engineer of the Corporation Commission of Oklahoma said in a recent address, the best thing that can happen to a utility is to secure a large percentage of its customers as owners of its stock.

Utilities, as a rule, must have huge amounts of capital as compared with private business in like localities. The merchant turns over his investment several times a year and each turnover yields a profit. The utility must make a far larger investment and turns over its capital only once in several years. A merchant may do a business of $200,000 a year on an investment of $50,000; to obtain a $200,000 annual business the utility must have an investment five times as great.

Fortunately people are beginning to realize the truth of what the Toledo mayor said about the necessity of monopoly. Frank and full publicity and a spirit of service on the one side and fair-minded tolerance on the other will bring the public and the public utility together to mutual advantage.

GENERAL

CHAIRMEN OF GENERAL COMMITTEES ORGANIZED TO DATE

Accident Prevention—F. W. Fisher, Rochester, N. Y.

Amendments to Constitution—Wm. J. Clark, Mt. Vernon, N. Y.

American Engineering Standards Committee, Representative on—A. H. Hall, New York, N. Y.—(Alternate Representative) W. J. Serrill, Philadelphia, Pa.

Representatives on Sectional Committees—Underground Construction—National Electrical Safety Code—C. C. Simpson, New York, N. Y. Illumination, Nomenclature and Photometric Standards—W. J. Serrill, Philadelphia, Pa. Ventilating Code—Geo. E. Bennett, New York, N. Y. Safety Code Correlating Committee—W. R. Addicks, New York, N. Y.—(Alternate Representative) Donald McDonald, New York, N. Y.

Award of Beal Medal—R. B. Brown, Milwaukee, Wis.

Chamber of Commerce—D. D. Barnum, Boston, Mass.

Cooperation with Educational Institutions—C. N. Chubb, Davenport, Ia.

Finance—James Lawrence, New York, N. Y.

Gas Safety Code—W. R. Addicks, New York, N. Y.

Gas Standards—J. B. Klumpp, Philadelphia, Pa.

Geographic Sections—L. R. Dutton, Jenkintown, Pa.

National Fire Protection Association—R. S. Doull, New York, N. Y.

Nominating—C. M. Cohn, Baltimore, Md.

Rate Fundamentals—R. A. Carter, New York, N. Y.

Rate Structure—T. V. Purcell, Chicago, Ill.

Standard Gas Appliance Specifications—W. T. Rasch, New York, N. Y.

United States National Committee of International Commission on Illumination, Representative on—Howard Lyon, Gloucester, N. J.

National Chamber Endorses State Regulation

The Chamber of Commerce of the United States, at its eleventh annual convention in New York City, adopted the following resolution favoring state regulation of public utilities:

PUBLIC UTILITY REGULATION

Regulation of public utilities has developed through its various stages until the principle of regulation, through a body created by the State, has been recognized throughout the country as best calculated to result in decisions equitable alike to utilities and their patrons, and to determine the questions of large importance both to utilities and their owners and to the public.

The advance which has thus been made should be maintained. As the source of the power of regulation of utilities, each state should exert this power through its own agency and should not attempt to delegate it to local authorities. Such a course would represent retrogression, and its consequences would be detrimental to the best interests of the public.

In a resolution on Federal Taxation, the Chamber made the following reference to tax-exempt securities:

Existing situations tend to create classes of privileged persons who enjoy incomes free from taxation while withdrawing their money from the ordinary uses of industry and commerce, with consequences of inequity in shifted burdens of taxation and in other ways. Such a situation is caused by the possibility of issue of classes of securities, the income from which is exempt from income taxes.

Both resolutions were sponsored by the three national utility associations.

Construction Budget*

H. C. DAVIDSON, New York, N. Y.

BUDGETARY control is particularly important to a public utility in respect of its construction expenditures. Its investment in additions and extensions usually originates primarily from necessity to ensure uninterrupted service and meet a larger demand upon its service. It cannot defer the enlargement of its plant until financial conditions may be favorable or increased profits are assured from the additional investment. The co-ordination between the commitments for construction expenditures and the ability to finance these additions under favorable conditions is, therefore, an essential part of its financial management.

The construction budget provides an effective means of accomplishing this co-ordination by a standardized routine. Its object may be broadly defined as:

(1) To insure a well balanced and carefully planned construction program.
(2) To provide a basis of centralized executive control over expenditures for plant and property, and
(3) To furnish the executives with a forecast of the proposed construction outlay sufficiently in advance of the actual requirements to permit adequate planning of necessary financing.

Presumably no company can continue the policy of expansion indefinitely without involving the necessity of interesting additional capital in some form, and we believe every company has a budgetary program to a greater or lesser degree. It may consist merely of informal estimates not rounded into a comprehensive plan, but the same fundamentals exist. It is hardly necessary, therefore, to enter into a detailed discussion of the advantage of the formal budget, and consideration of the subject is directed primarily to a suggested procedure for a definite program.

The elaborateness of the program will depend upon the conditions of the individual company. In a small company where the executive may be in intimate contact with the details of the plant, the program may be agreed upon practically without the necessity of formal records, whereas the same result in the larger companies may require interdepartmental records and a regular routine. Physical conditions may also affect the routine necessary. More complete reports, for instance, will be required by a company whose executive offices are located at a distance from the actual operations than by one whose executives are within immediate access to the original details.

A budget may cover a definite period, for which the period of a year is recommended for the construction budget, or may be continuous, providing for a uniform period in advance by the addition of a month to the forecast as each month is passed and dropped from the schedule. The continuous budget has the advantage of a definite program at all times for, say, a year in advance, but construction plans do not lend themselves as satisfactorily to piecemeal consideration of plant additions as in the case of a forecast of operations, particularly in localities where the construction is seasonal and large

*First tentative draft of report on Construction Budget prepared for the Report of the Budget Committee to be presented before the Accounting Sessions, 1923 Convention at Atlantic City.

projects are usually undertaken as far as possible under the more favorable conditions of the summer months.

The annual budget necessarily accumulates a certain amount of deadwood before the end of the year, but, on the other hand, affords a more definite comparison progressively during the year between the forecast and actual expenditures. It likewise may become incomplete before the end of the year, by the changes in plans or conditions which could not have been foreseen at the time of its preparation, and quarterly consideration is recommended whether the annual or continuous budget is adopted, for action in the one case upon such additions as may have become necessary since its adoption, and in the other for the inclusion of the additional quarterly period. The annual budget is discussed in the procedure outlined below as the routine is substantially the same under either method.

The initial step in the procedure of preparation of the construction budget is a report from each operating superintendent to the chief engineer or proper executive, containing recommendations of the ordinary extensions and additions needed, each project being reported upon a separate sheet for individual consideration. Thus, the operating engineers become an integral part of the organization in the consideration of plant additions. These reports should include, also, items of major repairs, as action upon proposed construction may be directly affected by the policy adopted in connection with changes to existing plant, or a single project may involve both alterations and new construction. Such reports should be made from time to time as the need arises, but for the annual budget system complete recommendations should be made at least two or three months prior to the beginning of the year.

These recommendations should be passed upon first by the chief engineer, and have his approval before the preparation of estimates of the cost of the work contemplated. In fact, the departmental reports may be considered merely tentative suggestions for his guidance as a preliminary survey to be revised, amplified or disapproved according to his judgment. Alternate plans as to the same project may also be submitted for estimates, for final decision after the comparative costs are known. When material changes in the program are made, it is recommended that the superintendent in question participate in such decision, that he may be entirely familiar with the revised plans for his department.

Items representing major extensions to provide for the anticipated growth of the company, or expansion of its activities, will probably originate with the chief executive, and will require estimates by the new business manager of the volume of sales for several years in advance, and the recommendations of the engineers as to the most desirable type and location of the additional facilities.

For the purpose of the budget, "round figure" estimates are usually made, as too much time would be required for detailed plans and exact quotations. Attempt should be made, however, to determine as accurately as possible by short-cut methods the estimated cost, in order that the budget may be of the greatest value.

When estimates have been made of the costs of the various projects tentatively considered, the data is ready for the formulation of the final construction program to be submitted for approval. The procedure at this point will depend upon the manner in which a company is or-

ANNUAL BUDGET, 19___ Authorization No._____

_____Company

_____

Budget Reference No._____ Project No._____ Class Improvive Desirable

DETAILS OF PROJECT

Location

Description of Project

ITEM A

Purpose and Necessity

Estimated Period of Construction From_____ 19__ To_____ 19__

Estimated Total Cost $_____

Final Cost $_____

_____

_____

Approved: _____

ganized. The preparation of the budget may be made by the Budget Committee itself, or may be made by the construction engineers acting either as a formal subcommittee or by informal conference.

Two distinct functions, however, enter into the preparation of a budget:

(1) The physical construction needs for increased facilities or economies of operation, for which the construction engineers are best qualified to make recommendations unhampered, and

(2) Consideration of these needs in the light of financial conditions or in connection with the general policies of the company.

Whatever the form of a company's organization, the budget as originally drafted should, in the writer's opinion, represent the former, to be subject to revision as may be required before final adoption. It is immaterial whether the Budget Committee fulfill the one function and the Board of Directors the other, or the Budget Committee assign the former function to the engineering staff and reserve its approval to the final program which it may ask the Board to authorize.

It is the usual practice to group the budget projects recommended according to the urgency of the work, for which the

ANNUAL BUDGET, 19____

_____ Company

_____,

Auth. No._____ Year of Auth._____ Budget Ref. No._____ Detail Sheet No._____

DETAIL OF UNEXPENDED BALANCE OF AN AUTHORIZATION OF A PRIOR YEAR

Location

Description of Project

FORM B

Amount approved by Budget Committee $_____

Amount authorized by Executive Committee $_____

Expended to Oct. 31, 19____ $_____

Payable in November and December, 19____ (Estimated) $_____ $_____

Unexpended Balance December 31, 19____ $_____

Status of Work under this Project _____% Completed

EXPLAIN BELOW:

1. Any variation between amount approved by Budget Committee and amount authorized by Executive Committee.

2. Overrun or underrun of amount of Executive Committee authorization if variation is greater than 10% or more than $1,000.

_____

_____

_____

_____

_____

Signed_____

classification of (1) Imperative, and (2) Desirable, appear to have been most commonly adopted. Some companies subdivide the projects in greater detail, according to the urgency or purpose of the construction, but it is believed that the two classes above will serve all ordinary needs for the average budget.

The budget should also include the expenditures necessary for the completion of projects authorized in prior years. Some companies re-estimate the cost of the construction remaining, revising the estimate to conform to changes in plans which may have been adopted since the original budget authorization was approved. Other companies prefer to adhere to the original budget figures, providing in the current year's budget only for the actual unexpended balances, and to report separately proposed additional expenditures arising from revision of the initial program.

Suggested forms are appended for report of each project in detail to the Budget Committee, Form A being assigned to report new work, and Form B for report of unexpended balances of prior years' authorizations. This latter form provides for explanations of substantial variations between the original estimate and the cost of the job to date in relation

to the percentage completed of the total work.

An additional form may be used, if desired, for the original departmental recommendations, but it is believed one form will serve every purpose by using the original report as the working copy or master sheet for all papers pertaining to changes, all estimates, and other data as to the project, and by typing a copy as finally submitted for the consideration of the Budget Committee.

Summary sheets (Forms C & D) are also appended, for grouping and summarizing the individual projects finally adopted, cross reference being made to the detail sheets by serial number.

It is realized that no standard forms can be recommended which will fit the needs of all companies, and the forms submitted are offered only as a guide to be adapted to the accounting practices and revised to the nomenclature of the individual company.

ANNUAL BUDGET, 19____ SUMMARY OF PROJECTS

_____ Company

Reference Number	Project Number	Location	DESCRIPTION OF PROJECTS	ESTIMATED TOTAL COST		Total
				Immediate	Deferable	
			FORM C			
			Total of Budget for 19.....			
			Unexpended Balances, Appropriations of prior years (Details attached)			
			Total			

ANNUAL BUDGET, 19____

_____ Company

SUMMARY OF UNEXPENDED BALANCES OF APPROPRIATIONS OF PRIOR YEARS

Year of Auth.	Budget Proj. No.	Detail Sheet No.	DESCRIPTION OF PROJECT	Amount of Authorization	Expended to Oct. 31, 19.....	Balance Unexpended at Oct. 31, 19.....	Appns. to Nov. 1, Dec. 31, Estimated	Possible Budget 19..... Recommend
			FORM D					

The budget will be of little value unless a check is maintained upon those responsible for its execution and accountability is established for variations between the estimated expenditures and the actual costs. It is incumbent upon the Accounting Department, therefore, to maintain a record, in some form, classifying the construction costs by budget items.

The form of such a record will depend upon the accounting practices employed. If a job order system is used, the job order—or a master sheet summarizing several orders applicable to the same budget item—will serve as a convenient means of compiling the necessary data. Companies not using the construction job order system may accomplish the result by a budget record to which all entries affecting budget items are posted. If a columnar construction ledger is used, it may be possible, by the assignment of separate columns, to provide automatically the budget information without additional clerical labor.

For the purpose of complete data during the progress of the work, the Construction Department may also require for its needs a record of expenditures on each budget project. This record will take into account contractual obligations as incurred and will serve as a guide to the engineers during the construction period, and upon the completion of each project and the entry of all charges in the books should be reconciled with the Accounting Department record of the actual cost.

Some companies maintain an authorization system in addition to the budget, requiring the approval of the Board of Directors or the Executive Committee for all expenditures over a certain sum or upon all construction and repair work. While this authorization may appear to be a duplication of the budget routine, the approval of the Board is not usually asked until detailed plans have been drawn and actual quotations obtained and the company is ready to go ahead with the work or let the contracts. The authorization represents, therefore, the approval of specific expenditures before the contractual obligations are incurred.

The amounts so approved by the Board may frequently differ from the budget forecast, as detailed plans may reveal the necessity of changes in type or capacity of apparatus, etc., or prices may have changed since the preparation of the budget. The budget records, therefore, under these conditions will require comparative statements by items, setting forth (1) the amount provided in the Budget, (2) the expenditure authorized by the Board or Executive Committee, and (3) the actual cost.

Again, the existing routine will govern the method to be employed for recording these authorizations and identifying them with the budget items. Provision may be made in a budget record to include this item automatically. In the case of the budget classification in the ledger, however, a file of the transcripts of the minutes with the budget numbers entered thereon as a supplementary record may be more satisfactory.

The monthly report of budget expenditures, if comparison only with the budget is involved, will be simple in form. If the authorization system is combined with the budget it must provide for comparison between the actual expenditures and both the budget allowance and amount of the authorization.

Practices appear to differ as to the inclusion in the budget report of expenditures made in prior years upon projects extending into the current year. The

_____ Company

BUDGET AND AUTHORIZATION REPORT

For the ____ Months Ended _____ 192

PROJECT	AMOUNT OF BUDGET		AMOUNT OF AUTHORIZATION			AMOUNT EXPENDED		UNEXPENDED BALANCE	
	NO.	AMOUNT	NO.	DATE	AMOUNT	Prior to Jan 1	____ Months Ended _____	OF BUDGET	OF AUTHORIZATION
	(Col. 1)	(Col. 2)	(Col. 3)	(Col. 4)	(Col. 5)	(Col. 6)	(Col. 7)	(Col. 8)	(Col. 9)
				FORM B					

budget itself involves only comparison with expenditures of the current year, as it includes only the unexpended balances of construction commenced in previous years. As to the Executive Committee or Board authorization, however, report may be required of the aggregate expenditure upon each authorization, in which case the amounts expended in prior years upon current projects may become a necessary part of the report.

Form E appended is designed to provide for the maximum requirements of such report, and is submitted subject to revision as to Column 6 (expenditures prior to the current year) according to the practices followed. If the figures reported in Column 5 represent only the balances unexpended as of Jan. 1st of Executive Committee authorizations approved prior to that date, Column 6 may be eliminated. If, however, the actual amounts authorized are recorded in Column 5, Column 6 is necessary for proof of the unexpended balance remaining.

This report showing cumulatively the elapsed months of the budget period and adapted in size and form to other Accounting Department statements, is recommended as a part of its regular monthly reports. It is important also that it account for the total charges to Plant and Property during the period reported. If there be items not provided for in the budget, which by reason of their small amount may not have required authorization by the Board, such expenditures should also be included in a separate group, in order that the total of the Budget Report may be in complete balance with the books of account.

"Not Interested," says Mr. Hearst

William Randolph Hearst informed the Association on May 7th that he had no interest, directly or indirectly, in a string of Kansas natural gas properties reported to have been purchased for the Hearst interests by Philip Francis, editorial writer on the staff of the New York American.

A recent news dispatch from Topeka, Kansas, stated that Mr. Francis had appeared before the Kansas Public Utilities Commission as the representative of Mr. Hearst, and had announced that the control of the Union Public Service Company, which owns the gas distributing plants in more than twenty cities and towns in Eastern and Southern Kansas, had been taken over by the Hearst interests.

Associations Affiliated with A. G. A.

Canadian Gas Association
Date of Affiliation—Mar. 25, 1919
Pres.—Col. D. R. Street, Ottawa Gas Co., Ottawa, Ont., Can.
Acting Sec.-Tr.—E. A. Hills, Consumers' Gas Co., Toronto.
Conv., 1923.

Empire State Gas and Electric Association
Date of Affiliation—Nov. 21, 1919
Pres.—M. J. Brayton, Utica Gas & Electric Co., Utica, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.
Conv., 1923.

Illinois Gas Association
Date of Affiliation—Mar. 19, 1919
Pres.—Robert B. MacDonald, Peoples Power Co., Moline, Ill.
Sec.-Tr.—R. V. Prather, 305 Illinois Mine Workers Bldg., Springfield, Ill.
Conv., 1924.

Indiana Gas Association
Date of Affiliation—April 24, 1919
Pres.—F. B. Tracy, Central Indiana Gas Co., Muncie, Ind.
Sec.-Tr.—E. J. Burke, Citizens Gas Co., Indianapolis, Ind.
Conv., 1924.

Iowa District Gas Association
Date of Affiliation—May 21, 1919
Pres.—H. B. Maynard, Citizens Gas & Electric Co., Waterloo, Ia.
Sec.-Tr.—H. R. Sterrett, Des Moines Gas Co., Des Moines, Ia.
Conv., 1924.

Michigan Gas Association
Date of Affiliation—Sept. 18, 1919
Pres.—Fred W. Seymour, Battle Creek Gas Co., Battle Creek, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.
Conv., Grand Rapids, Mich., Sept. 19-20.

Missouri Association of Public Utilities
Date of Affiliation—June 18, 1920
Pres.—E. R. Locke, Missouri Utilities Co., Mexico, Missouri
Sec.-Tr.—F. D. Beardslee, 315 N. 12th St., St. Louis, Mo.
Wiley F. Corl, Chmn. Affiliation Com., Missouri Utilities Co., Mexico, Mo.
Conv., On Steamer "Harry G. Drees" from St. Louis, May 23-26.

New England Association of Gas Engineers
Date of Affiliation—Feb. 19, 1919
Pres.—C. E. Paige, C. H. Tenney & Co., Boston, Mass.
Sec.-Tr.—J. L. Tudbury, Salem Gas Light Co., Salem, Mass.
Conv., Boston, 1924.

Gas Sales Association of New England
Date of Affiliation—Oct. 1, 1919
Gov.—F. A. Woodhead, Arlington Gas Light Co., Arlington, Mass.
Sec.—M. Bernard Webber, 150 Congress St., Boston, Mass.
Annual Meeting, 1923.

New Jersey Gas Association
Date of Affiliation—April 25, 1919
Pres.—James P. Hanlan, Public Service Gas Co., Newark, N. J.
Sec.-Tr.—R. A. Koehler, Public Service Gas Co., Newark, N. J.
Conv., 1924.

Pacific Coast Gas Association
Date of Affiliation—Sept. 18, 1919
Pres.—F. S. Wade, Southern Counties Gas Co., Los Angeles, Cal.
Sec.-Tr.—W. M. Henderson, 812 Howard St., San Francisco, Cal.
Conv., Del Monte, Cal., Sept. 11-14.

Pennsylvania Gas Association
Date of Affiliation—April 10, 1919
Pres.—Grier Hersh, York Gas Co., York, Pa.
Sec.-Tr.—Geo. L. Cullen, Harrisburg Gas Co., Harrisburg, Pa.
Conv., 1924.

South Central Gas Association
Date of Affiliation—Oct. 15, 1919
Pres.—F. C. Armbruster, Southwestern Gas & Electric Co., Shreveport, La.
Sec.-Tr.—S. J. Ballinger, San Antonio Public Service Co., San Antonio, Texas.
Conv., 1923.

Southern Gas Association
Date of Affiliation—May 20, 1919
Pres.—P. H. Gadsden, The United Gas Improvement Co., Philadelphia, Pa.
Sec.-Tr.—G. H. Smith, City Gas Co., Norfolk, Va.
Conv., 1924.

Wisconsin Utilities Association
Pres.—Harold L. Geisse, Wisconsin Valley Electric Co., Wausau, Wis.
Exec.-Sec.—J. N. Cadby, 445 Washington Bldg., Madison, Wis.
Conv., 1924.

Geographic Divisions

Eastern States Gas Conference
Date of Formation—April 11, 1923
Pres.—P. H. Gadsden, The United Gas Improvement Co., Philadelphia, Pa.
Sec.-Tr.—L. R. Dutton, Philadelphia Suburban Gas & Electric Co., Jenkintown, Pa.
Conv., 1924.

ACCOUNTING SECTION

J. W. HEINS, Chairman — W. A. SAUER, Vice-Chairman

H. W. HARTMAN, Secretary

MANAGING COMMITTEE—1923

At Large

BARKER, W. S., Newark, N. J.
BISSELL, J. H., Boston, Mass.
BRINE, F. A., Atlanta, Ga.
CASSELL, W. H., Baltimore, Md.
DAVIDSON, H. C., New York, N. Y.
DOERING, W. A., Boston, Mass.
FENNIMAN, J. R., New York, N. Y.
HALL, I. S., Boston, Mass.
HOFFMAN, F. C., St. Paul, Minn.
JEFFREY, JOS., Scranton, Pa.
LAWALL, H. J., Philadelphia, Pa.
LAWRENCE, JAMES, New York, N. Y.
LYNCH, B. W., Chicago, Ill.
MEYERS, W. J., New York, N. Y.
MURFIT, W. G., Newton, Pa.
PATTERSON, F. H., Rochester, N. Y.
POTTER, O. F., Newark, N. J.
RASTENBURG, F. G., Indianapolis, Ind.
REESE, J. G., Baltimore, Md.
SCHMIDT, JR., WM., Baltimore, Md.
SCOTT, J. M., Wilmington, Del.
SHORT, A. F., Providence, R. I.
TOSSELL, A. L., Chicago, Ill.
WINTERS, A. C., Chicago, Ill.

Representing Affiliated Societies

ARMSTRONG, J. J., Toronto, Can. (Canadian)
CLINTON, DEWITT, Worcester, Mass. (N. E. Gas Eng.)
DEAL, E. C., Springfield, Mo. (Missouri)
GOODNOW, A. C., Jacksonville, Fla. (Southern)
HAASE, EWALD, Milwaukee, Wis. (Wisconsin)
HODGES, E. W., San Francisco, Cal. (Pacific Coast)
JAMES, F. M., Aurora, Ill. (Illinois)
KURTZ, ADAM, Detroit, Mich. (Michigan)
McCABE, J. B., Dallas, Texas (South Central)
PETTES, W. H., Newark, N. J. (New Jersey)
PHILLIPS, R. E., Lincoln, Neb. (Iowa)
PORTER, EDWARD, Philadelphia, Pa. (Pennsylvania)
SCOBELL, E. C., Rochester, N. Y. (Empire State G. & E.)
SHARON, B. P., Hammond, Ind. (Indiana)
WILBUR, A. A., Brockton, Mass. (Gas Sales of N. E.)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Budget—F. H. PATTERSON, Rochester, N. Y.
Customers Accounting—W. A. DOERING, Boston, Mass.
Fixed Capital Records—H. J. LAWALL, Philadelphia, Pa.
Insurance—J. G. REESE, Baltimore, Md.
Nominating—EWALD HAASE, Milwaukee, Wis.
Relations with Customers—A. L. TOSSELL, Chicago, Ill.
State Representatives and Contributions to Monthly—JAMES LAWRENCE, New York, N. Y.
Uniform Classification of Accounts—W. J. MEYERS, New York, N. Y.

The Value of the Right Personnel in Customer Service

LOUIS STOECKER, Traveling Auditor, Public Service Gas Co., Newark, N. J.

Second article of a Series dealing with the Relations of Company and Customer. (EDITOR'S NOTE.)

FRANKLY, the purpose of the utilities' efforts to give better service and to improve relations with the customer, is to gain his confidence and to secure and hold his good-will. Naturally, to attain this end, the basis of confidence must be sought. Analyzed, confidence is found to be the cumulative result of favorable reactions to daily contacts.

The creation of the proper contact, then, must be the direction of the utility's endeavors. Office lay-outs, dispatching, and the physical performance of the order, stressed in all discussions of service and customer relations, are important adjuncts to service and have a direct bearing on the satisfaction of the customer. But service, in its broader sense, with confidence as its ultimate goal, must establish that most important factor in all relations—the personal element.

With the close relationship between pro-

prietor and customer a thing of the past, modern business on its present extensive plane makes the individual employe the only means through which the personal element can be expressed. The impossibility of direct contact with the customer by the management of to-day necessarily compels the delegation of many duties pertaining to customer relations to the rank and file. This results in the employe becoming the main point of contact for the customer. To him, the employe is the company, and from the latter's attitude and conduct, the customer receives his impressions and draws his conclusions and opinions of the company. It is in this contact that the extent of the confidence and good-will for the company is determined by the degree of the personal element expressed by the employe through courtesy, interest, understanding, and the desire to serve.

Though the mission of conveying the personal element is truly the individual employe's, the responsibility for the calibre of the employe and his attitude toward the customer rests solely with the company. Its responsibility starts with the selection of the employe. Too often, labor conditions and the ever-present pressure of work compels the employment of an applicant with little or no consideration given to his possession of the potential qualities of a representative employe, or even for the immediate position for which he is selected. Often a selection, under these circumstances, will be reflected by friction and complaints. Continuing the employe in a position where contact with the public is possible, will cause further embarrassments and will, eventually, cause the customer to question the company's sincerity to gain his good-will.

On the other hand, the possession of the potential qualities is no assurance of their expression or development without proper training of the employe and the direction of his efforts by the company. This is especially true of the employe's preliminary training in his immediate work. His success or failure and his future value and importance to the company rest to a considerable extent upon the thoroughness of this preliminary training. To place him in a position where customer contact of any degree is possible without detail knowledge of the work or lacking a clear understanding of the company's policies, is to invite failure to the employe and embarrassment for the company. It may also lead to the discouragement of the employe and a loss to the company of one who might otherwise have proven himself worthy.

The preliminary period probably finds the average employe always in an enthusiastic state. Every day something new develops in line with his work and another viewpoint of the operation of his immediate position is obtained. But sooner or later his daily tasks become routine. It is at this time that the right kind of employe will seek knowledge of the operation of the company beyond his own narrow sphere. He realizes that with this additional information he is in a position to give better service to the customer. Except by hearsay and general observation he is not always able to obtain this knowledge of his own accord. Much depends upon the company and the opportunities it gives the employe to secure this insight of the business. An occasional visit to other departments, especially visits between commercial and operating departments, will enable him to gain an understanding of the problems and conditions that must be met, and to realize the part that his work plays in

helping the company to give efficient service.

The opportunities extended to the employe to broaden and widen his scope of knowledge of the company's activities will find response in his aroused interest. Thorough understanding of his own department's functions and their relation to the business of the company as a whole not only inspires him with confidence in himself but also in his company and its methods of conducting business. To such an employe his position assumes more importance than ordinary routine and he realizes that his individuality still counts though merged in a large organization. He senses the personal element in his relations with the company and to the same degree reflects it in his contact with the customer.

The customer becomes one of the first considerations of an interested employe. To him the individual customer is more than merely one of the general public—he is a potential friend for the company. It is, therefore, only natural for the employe to assume a friendly attitude in his relations with the customer. A desire to serve and give satisfaction is inspired by the confidence in his company and its ability to render service. An understanding of conditions not only confronting the company but those with which the customer must contend, enables him to visualize quickly the problems of a customer and to advise and assist him in an intelligent manner.

A realization on the part of the customer that a call on the company is responded to with reliable information or prompt assistance to overcome his trouble, gradually inclines him to consider the company in a friendly light. A repetition of such experiences by himself and his friends will quickly convince him of the sincerity of the company's desire to please the customer, and his confidence is won.

The employe and his attitude toward the customer, therefore, are of paramount importance to the company's customer relations. This is especially true in consideration of the fact that without exception the business of the gas company, more than any other, takes the employe in closer relationship with every customer at some time or another. Much of this relationship also occurs on the customer's premises away from all direct supervision of the employe by the company, and with customers who probably never have any other contact with the company. On this account, the gas man on the street, fitter, canvasser, salesman, collector and meter reader, is a most vital factor in customer relations. Through him, the company is judged by the majority of customers; he is what the company's policies make him.

New Members

Manufacturer Company Members

The Honeywell Heating Specialties Co.,
A. P. Mudgett,
119 W. Canal St.,
Wabash, Indiana.

The Beckwith Co.,
J. A. Howard, Sec. V. Pres.,
Dowagiac, Michigan.

The Superior Mfg. Co.,
A. J. Fersch, Asst. Treas.
Liverpool St.,
Pittsburgh, Pa.

Tinnerman Stove & Range Co.,
A. H. Tinnerman, Owner,
2038 Fulton Road,
Cleveland, Ohio.

The STORY of what a B. T. U. should BE TO YOU

Have you ordered your copies of this interesting and instructive little booklet?

ADVERTISING SECTION

B. J. MULLANEY, Chairman — J. M. BENNETT, Vice-Chairman

CHARLES W. PERSON, Secretary

MANAGING COMMITTEE—1923

At Large

BARNES, CYRUS, Boston, Mass.
BLANCHARD, FRANK, L., New York, N. Y.
CADBY, J. N., Madison, Wis.
COONEY, E. J., Lowell, Mass.
HAWKS, A. W., JR., Baltimore, Md.
HUMM, A. W., New York, N. Y.
LEACH, F. A., JR., San Francisco, Cal.
POTTER, CLYDE H., Los Angeles, Cal.
PREZIANO, E. P., New York, N. Y.

Representing Affiliated Societies

BURNS, J. J., St. Louis, Mo. (Missouri)
CAMPBELL, E. C., Benton Harbor, Mich. (Michigan)
CLIFFORD, F. S., Fitchburg, Mass. (Gas Sales of N. E.)
CRONE, F. W., New York, N. Y. (Empire State G. & E.)
DEFREES, S. E., Rome, Ga. (Southern)
ENGLISH, A. L., Council Bluffs, Iowa (Iowa)
FRANKLIN, S. L., Millville N. J. (New Jersey)
GOULD, WM., Boston, Mass. (N. E. Gas Eng.)
JAMES, F. A., Ottawa, Ont., Can. (Canadian)
JASPERSON, R. O., New York, N. Y. (Wisconsin)
MULHOLLAND, S. E., Fort Wayne, Ind. (Indiana)
MYRTLE, F. S., San Francisco, Cal. (Pacific Coast)
ROLSTON, R. J., Philadelphia, Pa. (Pennsylvania)
SOULE, E. E., Peoria, Ill. (Illinois)

Why Public Utilities Should Advertise

W. P. STRANDBORG, President, Public Utilities Advertising Association.

IN A GREAT many public utility companies the underlying reason why the executives have not been "sold" on the idea of the value of advertising is because their training, experience and habitual viewpoint have not brought advertising clearly above their horizon. If they have glimpsed its meaning at all, it has generally been that it deals with intangibles to a greater or less degree—and intangibles are something that technical engineers, lawyers and unimaginative operatives and managers have had little sympathy with or understanding of.

But, once these executives have been "shown" what advertising has done and can do, when given an honest and thorough test, a great majority of them give it the recognition its importance deserves.

The writer has come in contact with many such cases, and that is why he has set down a few of the reasons why public utilities should advertise—so that our members, if they feel that their own companies are not giving the proper prominence to advertising, may use some of these suggestions as the basis for "selling the idea to the boss."

Public Utilities Should Advertise, Because:

We have a $17,000,000,000 investment to protect.

This gigantic investment is subject to attack and harassment by legislative bodies, the general public and the newspapers to a greater extent than any large and legitimate business in the country.

We do $3,000,000,000 worth of business a year, and because intelligent advertising will stimulate it to greater growth.

We are far in the rear of every other modern business in the field of advertising.

We need the greater good will of our 33,000,000 customers.

Our business comes into more intimate daily contact with more people than any other line of business in the world.

Our business, which is so essential to the comfort and well-being of the people, is highly technical and the public does not understand it.

Our problems are the problems of the people and we need their sympathetic understanding and support.

The people will be fair when they do understand all the facts, and systematic advertising is the most effective way to tell our story and give the people the facts.

Our exclusive business is salesmanship in its broadest application, and every form of salesmanship needs the fifty-fifty push and punch of advertising.

The selling of public service—essential and indispensable public service, if you please—is known, by experience and test, to respond as rapidly and in as great a measure to judicious advertising as the selling of any legitimate merchandisable commodity.

Many of our companies sell securities just exactly as investment houses do. Where would investment houses be if they didn't advertise?

Many of our companies sell merchandise exactly as department stores and specialty shops do—institutions whose advertising appropriations average from 2 to 7 or more per cent of their gross each year.

The demand for any worthy product—service, security or commodity—can be created and stimulated by means of advertising.

The greater the demand for any product, the less will be the ratio of production cost, with proportionately greater economy of operation.

It is the specific function of advertising to create consumer demand and consumer preference.

Truthful, sincere, interesting and believable advertising is a recognized asset in modern business.

Advertising will bring the full benefits of the merit of our product.

Advertising is the most inexpensive motive power that our industry or any industry can buy today.

The great "buyers' strike" following the world war proved that more and better advertising meant more and better business and more and better good will.

The place of advertising in the present economic system is thoroughly well established.

Business exists, in the last analysis, in the minds of its customers.

While you may supply the actual needs of the public without advertising, the actual needs are but a fraction of the demand that can be created, and advertising is a prime mover in creating this demand.

Public utility commissions in many states have recognized advertising as a legitimate operating expense, both in the creation of good will and in business building, thereby nullifying the somewhat widespread popular criticism that advertising by public utilities is a needless extravagance.

A public utility that advertises consistently finds it easier to finance its requirements than one which does not advertise. Bankers generally look upon a good advertiser as a good borrower, and prospective borrowers are frequently asked "What is your advertising appropriation?"

Experience shows that public utilities which have adopted definite advertising programs on a budget basis have never abandoned this policy but, on the other hand, have shown a tendency to expand their advertising appropriations, year by year.

Advertising, properly used, will increase the turn-over for utilities just as it does in other lines of business.

This list of "becauses" is by no means complete. It could probably be elabor-

ated to twice the number given, and even among some of those set down there is some overlapping; yet, the main thought in mind is to show public utility companies that they have an abundant reason for giving advertising a fair trial and little, if any, reason, for not doing so.

When you consider in its widest relations, a mighty industry with a combined capitalization of over seventeen billions of dollars, with a yearly gross business exceeding three billions of dollars, dealing in intimate daily contract relations with an aggregate of over 33,000,000 customers—not counting the fifteen billions of car riders every year who are dependent upon modern urban electric railways for their transportation facilities, the importance of advertising to this industry need not be further emphasized.

Again, when we find that there is expended in the United States each year for advertising a total of something in excess of $1,400,000,000, and of this amount the four major utilities, electric railways, gas companies, light and power companies and telephone companies are using only about $7,500,000, it does look as if some of us haven't acquired a very keen sense of business proportion.

Based on a two per cent minimum of annual gross business, the four utilities mentioned should be spending around $60,000,000 instead of $7,500,000. Instead of the two per cent minimum, the utilities are trailing along with an average of approximately one-fourth of one per cent. Five years ago, the amount was probably less than half what it is now.

Looking into the historical development of the utility industry, the cause of this lack of understanding and appreciation of the value of modern advertising is found very near the surface. Most of the utility companies have passed through identically the same eras of development and in identically the same order. In each of these eras, a different factor has, generally speaking, been in control, or dominant in the activities of the undertaking.

1. Financing.
2. Legislative.
3. Engineering.
4. Operating.

In the first place, the financing of public utility enterprises, in the old days, was done entirely behind closed doors, and under the direction of bankers who didn't understand what you meant when you spoke of advertising; and whose chief concern was to see that the undertaking was developed along lines that would assure the investors a safe and profitable return on their money. In those days, bankers didn't advertise their own business, so why should they tell the public anything about how or why they were floating public utility ventures?

Then came the legal phase of public utility development. The lawyers had to be called in to see that the proper franchises were secured—grants clothed in involved, ornate, but highly significant language from the standpoint of the financiers and the lawyers, but generally meaningless to the rank and file of the public, most of whom were given to understand that the lawyers and bankers were doing the people a favor in accepting the franchises at any price or on any terms. It being unethical for lawyers to advertise in their own profession, it, of course, and obviously, was unethical for them to lay the cards on the table.

Now enters the engineering fraternity, the builders, the construction forces—the men of sextants, compasses, logarithms, blue prints, designers of equipment, etc.,

and so on. They dealt with curves, grades, steel rails, pole lines, conduits, tools, materials and algebraic formulae—not with human equations, or the general public interest. An engineer, in those days, couldn't grasp advertising because he couldn't put the calipers on it, and so far as "consumer demand" or "consumer preference" were concerned—"What ARE those things, anyway?"—"Get off our right-of-way!"

By and by, the engineers and builders turned the completed physical property and equipment over to the operating department, and the general manager or the operating vice-president mounted the saddle. He had two things to do. He had to make that property PAY—pay the stockholders, and he had to get that PAY out of the public, which, at various times and on various properties has been quite some job for even the most accomplished operating genius. The average operating official could not see where the public could have any particular interest in his affairs except to "ride the trolley," "burn the gas," "consume electricty" and "talk on the telephone." Advertising and publicity, as we understand it now, at least, did not enter into his calculations.

Sometime prior to the advent of the operating era, if we are to maintain the proper historical sequence in the development of the public utilities, there appeared another group of engineers—specialists they were—sort of detached gentlemen, known as "rate experts," who collaborated with the bankers and the lawyers in determining exactly what the public should pay for the service to be rendered.

It took the operating fraternity in the electric railway business a long time to realize that they had free advertising space of untold value right inside their own cars. For years this space was used for nothing but indifferent notices and announcement of changes in schedules and rules and regulations laid down for the conduct of the passenger on the car, etc. That shows how little was known of the value of advertising in those days.

Remarkable as it may seem, it is doubtful if any of the public utilities would have been doing much real systematic advertising yet if the "urge" hadn't come from the outside and been literally forced upon the utilities as a measure of self-defense and sometimes as an out-and-out life-saver.

In time, the political and financial power of the "big business" interests behind the larger utilities became so strong, and so much regard was shown for the welfare of the stockholders and so little concern for the well-being of the public, that the "worm turned"; that is, the public just naturally got tired of doing nothing but dropping loose change in the fare boxes two or four times a day, or paying gas, light and phone bills every month—they were paying the fiddler, and they wanted to enjoy the dance, too.

What the public has done in sundry matters intimately connected with the control, management and operation of public utilities is of such recent history that it need not be dwelt on, but, the ultimate outcome has been that the public itself is now dictating the rates it shall pay for service, and very largely, also, the quantity and quality of the service they shall be given.

Perhaps you will say that the utilities did do some advertising, that they did have publicity men to tell their story to the public and so on. In a sense, true, perhaps. But in the former days, all information given out was perfectly harmless—"hand-picked and sugar-coated"

for the most part. An occasional executive, or all executives, on occasion gave out formal, technical statements, the executives or legal departments formally answered complaints or criticisms appearing in the press.

The press or "praise" agent was the next development, and he sometimes used advertising as a "jimmy" to pry his way into the unsullied news columns with his honeyed propaganda. Newspapermen were often on the company pay roll as a further aid to getting the right kind of matter into the papers.

Of course, a certain amount of straight, legitimate "business building" advertising did creep into the industry in the course of time, but taken on the whole, it didn't amount to much.

It was the public clamor, its constantly accumulating ill will and hostility, together with inadequate service facilities, the increasing difficulty to obtain valuable grants, rights and franchises, the increased cost of operation, development of the public ownership idea, and in the electric railway field, the private automobile and jitney competition—and in all of the major utilities, the very much greater difficulty in financing capital requirements, the growth of regulation and adverse legislation—all these, almost every one of them outside influences, compelled the public utilities to analyze the whole situation and seek a remedy.

Inasmuch as it was entirely obvious that it was the public itself that has started their constantly accumulating horde of troubles, the remedy must be sought by dealing in some direct way with the source of trouble.

So it gradually began to dawn on the minds of these gentlemen, under pressure and light from the outside, that advertising (newspaper advertising) was the easiest, least expensive and most effective way of reaching the people anywhere and at any time. Advertising began to be used to help secure desired franchises, to secure badly needed increases in revenues, to dispose of jitney competition, to sell securities, to build up trolley riding, to increase gas, light and telephone usage and in the general field of merchandising as well.

And, without any notable exceptions, the utility companies which did advertise systematically, weathered the stress and storm of the war and the high cost era in much better shape than those companies which did not. Indeed, it was the war that "sold" advertising to many a utility executive, and it is its economic value that is selling him the idea stronger and stronger every day and rallying more and more executives to the cause of this great business and good-will building force as time goes on.

It is, moreover, in this fruitful field that the new Public Utilities Advertising Association expects to find its greatest usefulness.

Magazine Publicity

The April 28th issue of the Literary Digest contains an article entitled "Poisoning by Domestic Gas" which is a reprint of a former article appearing in Nature (London) together with data taken from the A. G. A. Monthly and information supplied by Oscar H. Fogg.

Information Cards for the Employe

ARTHUR F. SHORT, Treasurer, Providence Gas Company.

EARLY in the year at a meeting of the heads of departments of our company, the question of educational work among our employes was discussed. After considerable study of the subject we conceived the idea that if we could get up an attractive card of convenient pocket size and use it as a medium to present to our employes some concrete facts in connection with our company, it might be worth while.

We debated whether the cards should be distributed once a week or once in two weeks, and decided in favor of the latter. So far this has worked out very satisfactorily.

We had in mind two things which the distribution of the cards might accomplish.

First: To instill in the minds of our employes the fact that the gas industry is very much alive.

Second: To present one thought at a time in order that the employes might be kept interested, but not bored.

We had previously convinced ourselves that the usual run of pamphlets and booklets contained too much text matter, and that the majority of employes simply would not concentrate their minds long enough to wade through it. Hence, the desire to issue something terse and to the point.

I am sure that our first card showing send-out of gas was an "eye-opener" to nearly all of our employes. The second card showing increase in sale of appliances gave them a reason for the increased send-out of gas, and incidentally proved to them that all the talk about electric ranges was not affecting the sale of gas ranges and other gas appliances.

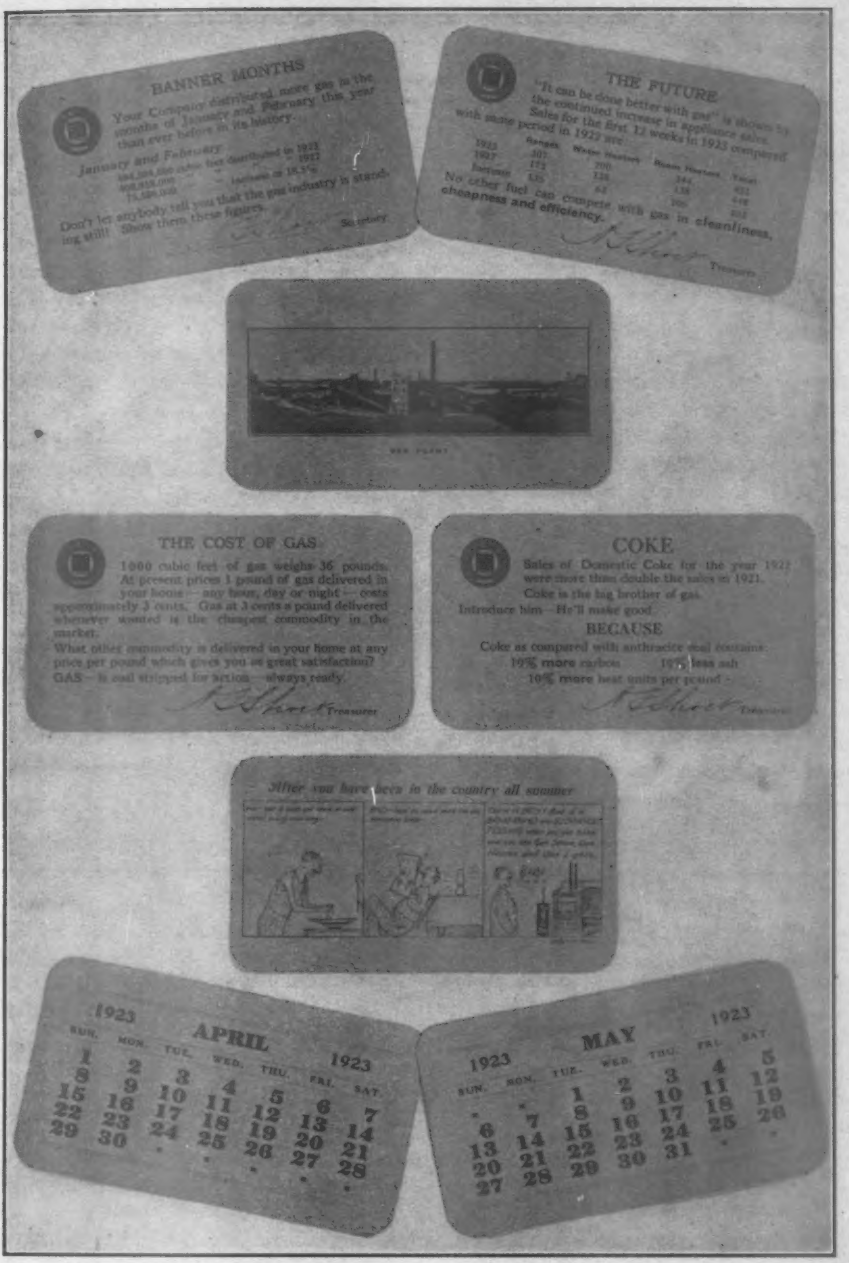
The third card gave them some idea of the cost of gas as compared to other commodities; and the fourth card was an appeal to get busy and talk coke, giving them the necessary talking points.

I feel that a great majority of our employes are keeping these cards for reference. On the back of the last card issued each month we are placing the calendar for the succeeding month, and on the other cards we are portraying something pertinent to the gas industry.

About 600 cards make up an issue. Every employe from the president down receives them and each card is signed by myself as treasurer. This makes it in the nature of a personal message from an officer of the company, and the personal touch appeals to many employes.

From now on we plan to number the cards and to touch upon a different subject each time rather than to stress the same subject successively. Of course this is a debatable procedure, but we feel that something new is what our employes are looking for and we believe, for example, that if we were to run three or four cards on coke (which of course we could very easily do) the cards would lose their effectiveness immediately.

We are keeping in close touch with the way the cards are being received and will continue to use them as long as interest can be kept up. As soon as interest lags, we will try something else. To date we are very much pleased with reports of their reception by our employes, but realize, of course, that "a new broom


BANNER MONTHS
Your Company distributed more gas in the months of January and February this year than ever before in its history.
January and February
Don't let anybody tell you that the gas industry is standing still! Show them these figures.
Secretary
THE FUTURE
"It can be done better with gas" is shown by the continued increase in appliance sales. Sales for the first 12 weeks in 1923 compared with same period in 1922 were:
Ranges
Water Heaters
Room Heaters
Vented
1923
1922
Increase
No other fuel can compete with gas in cleanliness, cheapness and efficiency.
Treasurer
THE COST OF GAS
1000 cubic feet of gas weighs 36 pounds. At present prices 1 pound of gas delivered in your home — any hour, day or night — costs approximately 3 cents. Gas at 3 cents a pound delivered wherever wanted is the cheapest commodity in the market.
What other commodity is delivered in your home at any price per pound which gives you as great satisfaction? GAS — is coal stripped for action — always ready.
Treasurer
COKE
Sales of Domestic Coke for the year 1922 were more than double the sales in 1921.
Coke is the big brother of gas.
Introduce him — He'll make good.
BECAUSE
Coke as compared with anthracite coal contains
19% more carbon
19% less ash
10% more heat units per pound
After you have been in the country all summer
1923
APRIL
SUN. MON. TUE. WED. THU. FRI. SAT.
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30
1923
MAY
SUN. MON. TUE. WED. THU. FRI. SAT.
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31

sweeps clean." Some of the comments that have been made are:

"I find the little cards both interesting and instructive. The others in my department are interested in them also. I have shown my cards to at least twelve people. If the others who get them do as well, it will spread the facts to quite a few people."

"All the heating department is interested in information on semi-monthly cards, and we are always pleased to get any write-up on gas or operation. I also appreciate the daily production report."

"I think the company is doing the right thing by passing out these small cards. It gives the employes a chance to know what the company is doing, where otherwise they would never know. Keep up the good work."

"I fully believe these cards are highly appreciated by most of the men, myself included, for they all seem interested in them and glad to get them."

"The general impression of the cards is favorable to all the men, inasmuch as it makes a man feel as if he is part of the organization that is doing good work and is of benefit to society. Personally, I am in favor of publicity and I believe that any corporation that confides in its organization is not making a mistake."

"I am mighty glad to get the cards and learn the progress that is being made, as well as the other valuable information that the cards contain. I appreciate the fact that this company is going to considerable expense to give us the information that we could not get in any other way. I read over these cards carefully and then I give them to someone who does not work for the company."

"I look forward anxiously for the next issue of the cards, as they are quite interesting. The vest pocket calendar is very useful. Also let me add that I think the recreation association is doing a great deal towards bringing the men together and causing a better understanding between them."

"I am pleased to receive the cards especially for one reason, that is, when someone asks or tries to argue on the merits or demerits of gas, I have something fresh in mind to talk about."

Free Supply of Slogan Strips

The Association has a supply of strips suitable for window display purposes featuring the slogan "If It Is Done With Heat, You Can Do It Better With Gas." The strips are two inches wide by forty inches long and the slogan is printed in yellow against a steel gray background—a very effective color combination.

We will be glad to send, free of cost, to our gas company and manufacturer company members as many strips as they can use. This offer is made possible through the courtesy of the Pittsburg Water Heater Company which has supplied strips to its thirty sales offices with the request that the slogan be given the widest publicity possible.

MANUFACTURERS SECTION

F. A. LEMKE, Chairman — G. W. PARKER, Vice-Chairman

C. W. BERGHORN, Jr., Secretary

MANAGING COMMITTEE—1923

At Large

BAILEY, JR., E. P., Cleveland, Ohio
COLLINS, D. J., Philadelphia, Pa.
CRANE, WM. M., New York, N. Y.
DE HART, JR., J. S., Newark, N. J.
DICKEY, E. S., Baltimore, Md.
GREENE, J. J., New York, N. Y.
KNAPP, F. H., Pittsburgh, Pa.
MAXON, H. R., Muncie, Ind.
MCDONALD, DONALD, New York, N. Y.
NORMAN, E. A., New York, N. Y.
ROBERTS, EARL W., Detroit, Mich.
SIMLER, O. P., Lorain, Ohio
STITES, TOWNSEND, Gloucester, N. J.
TAPPAN, W. H., Mansfield, Ohio

Representing Affiliated Societies

ABBOTT, M. E., Taunton, Mass. (Gas Sales of N. E.)
BARTLETT, C. E., Philadelphia, Pa. (New Jersey)
BARTLETT, C. E., Philadelphia, Pa. (Pennsylvania)
CREVISTON, A. E., Baltimore, Md. (Southern)
GIBSON, W. R., Toronto, Ont., Can. (Canadian)
HAMMOND, E. W., San Francisco, Cal. (Pacific Coast)
MCCULLOCH, CHARLES, Milwaukee, Wis. (Wisconsin)
NORTON, ARTHUR E., Boston, Mass. (N. E. Gas Eng.)
PARKER, JOHN F., Rockford, Ill. (Indiana)
ROPER, GEO. D., Rockford, Ill. (Illinois)
ROPER, GEO. D., Rockford, Ill. (Iowa)
SEIDENGLANZ, C. H., Dallas, Texas (South Central)
SMITH, W. L., Battle Creek, Mich. (Michigan)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Exhibition—F. A. LEMKE, Kalamazoo, Mich.
Nominating—J. S. DEHART, JR., Newark, N. J.
Division of Accessories Manufacturers—EARL W. ROBERTS, Detroit, Mich.
Division of Apparatus & Works Manufacturers—D. J. COLLINS, Philadelphia, Pa.
Division of Gas Range Manufacturers—W. H. TAPPAN, Mansfield, Ohio.
Division of Heating Appliance Manufacturers—E. P. BAILEY, JR., Cleveland, Ohio.
Division of Industrial Appliance Manufacturers—H. R. MAXON, Muncie, Ind.
Division of Lighting Appliance Manufacturers—TOWNSEND STITES, Gloucester, N. J.
Division of Meter Manufacturers—DONALD MCDONALD, New York, N. Y.
Division of Office Labor Saving Devices—E. A. NORMAN, New York, N. Y.
Division of Water Heater Manufacturers—O. P. SIMLER, Lorain, Ohio.
Division of Supply Manufacturers—J. J. GREENE, New York, N. Y.

Quality Merchandise Again

The following appeared in the Atlantic City, N. J., Union, May 12, 1923, under the heading "Against Heater. Gas Co. Will Shut Off Supply Where Unapproved Devices Are Used." (EDITOR'S NOTE).

THE USE of a type of gas water heater that is not approved by the American Gas Association is the reason given by the Atlantic City Gas Company for the illness of Mrs. Jane Bell, her little son, Clifford, and her mother, Mrs. Ada Wilson, who were overcome by gas fumes at their home, 206 Adriatic Avenue, Thursday night, and the company is emphatic in its warning that if such appliances are used the flow of gas will be shut off from the premises because of the danger involved.

Carbon monoxide, one of the most deadly gases known, is formed by the imperfect combustion of illuminating gas, a combination being formed between the unburned gas and the product of the combustion. It is many times more deadly than illuminating gas, and the danger from it is multiplied by the fact that it has no odor. It is the same gas that is found in the exhaust from an automobile engine.

In the heater in question the coils are set so close to the burner that it is impossible for all of the gas to be consumed, and this results in the forming of the carbon monoxide. A number of cases of poisoning from this cause having been recorded recently makes the gas company take a firm stand on the matter and a campaign of extermination against the appliances so offending will be waged.

Classified Directory—Manufacturers of Gas Equipment

Index of Manufacturer Company Members

A-B Stove Co. ..... Box 494, Battle Creek, Mich.
Acme Brass Works ..... 8211 Collins Ave., Detroit, Mich.
Addressograph Co. ..... 901 W. Van Buren St., Chicago, Ill.
Ajax Brass & Iron Co. ..... 398 Harmon St., Brooklyn, N. Y.
Alpha-Lux Co. Inc. ..... 192 Front St., New York, N. Y.
Alphons Custodis Chimney Construction Co. ..... 1449 Marquette Bldg., Chicago, Ill.
American Gas Appliance Co. ..... 118 Sanford St., Brooklyn, N. Y.
American Gas Construction Co. ..... Box 266, Newton, Ia.
American Gas Furnace Co. ..... Elizabeth, N. J.
American Ironing Machine Co. ..... 844 W. Adams St., Chicago, Ill.
American Lava Corp. ..... 1411 William St., Chattanooga, Tenn.
American Meter Co. ..... 105 W. 40th St., New York, N. Y.
American Radiator Co. ..... 816 S. Michigan Ave., Chicago, Ill.
American Range & Foundry Co. ..... 103 No. Michigan Blvd., Chicago, Ill.
Armstrong Cork & Insulation Co. ..... 24th St. & Allegheny River, Pittsburgh, Pa.
Atlantic Tubing Co. ..... 1756 Cranston St., Providence, R. I.

Bacharach Industrial Instrument Co. ..... Box 39 Homewood Sta., Pittsburgh, Pa.
Bailey Meter Co. ..... 2015 E. 46th St., Cleveland, O.
Baltimore Enamel & Novelty Co., The ..... Baltimore, Md.
Baltimore Gas Appliance & Mfg. Co., The ..... Bayard & Hamburg Sts., Baltimore, Md.
Banner Iron Works ..... 4560 Shaw Ave., St. Louis, Mo.
Barrett Co., The ..... 40 Rector St., New York, N. Y.
Bartlett & Co. Inc. ..... 1938 Market St., Philadelphia, Pa.
Bartlett Hayward Co., The ..... Box 1191, Baltimore, Md.
Bastian-Morley Co. ..... La Porte, Ind.
Beaumont Co., R. H. ..... 315 Arch St., Philadelphia, Pa.
Beckwith Company, The ..... Dowagiac, Mich.
Belgian American Coke Ovens Corp. ..... Postal Box 1420, St. Louis, Mo.
Benson Manufacturing Co. ..... 115 N. Desplaines St., Chicago, Ill.
Blodgett Co., The G. S. ..... 190 Bank St., Burlington, Vt.
Bristol Co., The ..... Waterbury, Conn.
Brunner Stove Co. ..... 441 East 123rd St., New York, N. Y.
Bryant Heater & Mfg. Co., The ..... 952 E. 72nd St., Cleveland O.
Builders Iron Foundry ..... Providence, R. I.
Burroughs Adding Machine Co. ..... Burroughs & Second Aves., Detroit, Mich.
By-Products Coke Corp. ..... 332 S. Michigan Ave., Chicago, Ill.

Canton Clothes Dryer Co., The ..... Canton, O.
Century Stove & Mfg. Co. ..... Du Pont Place, Johnstown, Pa.
Chambers Mfg. Co. ..... Shelbyville, Ind.
Chaplin-Fulton Mfg. Co., The ..... 36 Penn Ave., Pittsburgh, Pa.
Chicago Vitreous Enamel Product Co. ..... 1407 S. 55th St., Cicero, Ill.
Clark & Co. Div., Geo. M. ..... 179 N. Michigan Ave., Chicago, Ill.
Claus Automatic Gas Cock Co., ... 1630 Booth St., Milwaukee, Wis.
Cleveland Co-Operative Stove Co., The ..... 2323 E. 67th St., Cleveland, O.
Cleveland Gas Meter Co. ..... 2180 E. 65th St., Cleveland, O.
Cleveland Heater Co., The ..... 1900 W. 112th St., Cleveland, O.
Clow & Sons, James B. ..... 534 S. Franklin St., Chicago, Ill.
Combustion Utilities Corp. ..... 413 Kent Ave., Brooklyn, N. Y.
Commercial Gas Appliance Co. ..... 1714 Aliceanna St., Baltimore, Md.
Comstock Castle Stove Co. ..... Front & Washington Sts., Quincy, Ill.
Connelly Iron Sponge & Governor Co. ..... 227 Fulton St., New York, N. Y.
Connersville Blower Co. ..... Connersville, Ind.
Crandall Pettee Co., The ..... 150 Franklin St., New York, N. Y.
Crane Company ..... 836 S. Michigan Ave., Chicago, Ill.
Cribben & Sexton Co. ..... 800 N. Sacramento Blvd., Chicago, Ill.
Cruse-Kemper Co. ..... Ambler, Pa.
Cutler-Hammer Mfg. Co., The ..... 12th & St. Paul Aves., Milwaukee, Wis.

Dangler Stove Co. Div. ..... 5017 Perkins Ave., Cleveland, O.
Davidson Co., M. T. ..... 154 Nassau St., New York, N. Y.
Davis & Farnum Mfg. Co. ..... Waltham, Mass.
Defiance Check Writer Corp. ..... 1517 Elser Terrace, Rochester, N. Y.
Detroit Brass & Malleable Works ..... 1177 Holden Ave., Detroit, Mich.
Detroit Stove Works ..... 6900 E. Jefferson Ave., Detroit, Mich.
Detroit Washing Machine Corp. ..... 511 Leib St., Detroit, Mich.
Drakenfeld & Co. Inc., B. F. ..... 50 Murray St., New York, N. Y.
Dresser Mfg. Co., S. R. ..... 54 Boylston St., Bradford, Pa.
Duparquet, Huot & Moneuse Co. ..... 110 W. 22nd St., New York, N. Y.

Eastman Mfg. Co. ..... 1002 N. 11th St., Manitowoc, Wis.
Elgin Stove & Oven Co. ..... 14 Chicago St., Elgin, Ill.
Elliott-Fisher Co. ..... 342 Madison Ave., New York, N. Y.
Enamel Products Co. ..... Eddy Rd. & Taft Ave., Cleveland, O.
Equitable Meter Co. ..... 422 First Ave., Pittsburgh, Pa.
Erie Stove & Mfg. Co. ..... W. 18th St., Erie, Pa.
Estate Stove Co., The ..... East Ave., Hamilton, O.

Federal Tubing Co. ..... 328 N. Randolph St., Philadelphia, Pa.
Foundation Oven Corp. ..... 120 Liberty St., New York, N. Y.
Foxboro Co. Inc., The ..... Neponset Ave., Foxboro, Mass.
Franklin Sales & Burner Mfg. Co. ..... 4208 Carthage Pike, Cincinnati, O.
French Battery & Carbon Co. ..... Madison, Wis.
Fuller-Warren Co., The ..... 930-32nd St., Milwaukee, Wis.

Gallaher Boiler Co. ..... Laclede Gas Bldg., St. Louis, Mo.
Gas Engineering Co. ..... Trenton, N. J.
Gas Machinery Co., The ..... 1900 Euclid Ave., Cleveland, O.
Gas Purifying Materials Co. ..... Foot of Halsey St., Long Island City, N. Y.
Gas Utilities Corp. ..... 1200 Locust St., Philadelphia, Pa.
Gautier & Co., J. H. ..... Greene & Essex Sts., Jersey City, N. J.
Gehnrich Indirect Heat Oven Co. Inc. ..... Honeywell St. & Skillman Ave., L. I. City, N. Y.
General Gas Appliance Co. ..... 103 Park Ave., New York, N. Y.
General Gas Light Co. ..... Kalamazoo, Mich.—44 West Broadway, New York, N. Y.
Geyser Sales Co. ..... 139 N. Clark St., Chicago, Ill.
Globe Stove & Range Co., The ..... Kokomo, Ind.
Go-Ro Incorporated ..... Carrollton & Tulane Aves., New Orleans, La.
Grayson Mfg. Co., The J. H. ..... Athens, O.
Griffin & Co., John J. ..... 1513 Race St., Philadelphia, Pa.
Grinnell Co. Inc. ..... 260 W. Exchange St., Providence, R. I.
Guardian Gas Appliance Co. ..... 3409 Superior Ave., Cleveland, O.

Hale Manufacturing Co. ..... 115 N. Desplaines St., Chicago, Ill.
Harbison-Walker Refractories Co. ..... 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Harlan Co-Operative Coal Co. ..... Fayette Bank Bldg., Lexington, Ky.
Harrisburg Foundry & Machine Works ..... Harrisburg, Pa.
Hays Manufacturing Co. ..... W. 12th St., Erie, Pa.
Helme & Mellhenny ..... 17th & Clearfield Sts., Philadelphia, Pa.
Hoffman Heater Co., The ..... Washington Ave., Lorain, O.
Holyoke Heater Co. ..... 90 Sargent St., Holyoke, Mass.
Home Stove & Foundry Co. ..... 2600 W. 18th Place, Chicago, Ill.
Hones, Inc., Charles A. ..... Baldwin, Long Island, N. Y.
Honeywell Heating Specialties Co., The ..... 119 W. Canal St., Wabash, Ind.
Howard Stove Co. ..... 11th St. & 11th Ave., Beaver Falls, Pa.
Hugo Manufacturing Co. ..... West Duluth, Minn.
Humphrey Co., Div. Ruud Mfg. Co. ..... Kalamazoo, Mich.

Illinois Specialty Mfg. Co. ..... Box 90, Bloomington, Ill.
Improved Equipment Co., The ..... 24 State St., New York, N. Y.
Iron Hydroxide Co., ... Paschall Sta., Philadelphia, Pa.
Isbell-Porter Co. ..... 46 Bridge St., Newark, N. J.

Johns-Manville, Inc. ..... Madison Ave. & 41st St., New York, N. Y.
Johnson Gas Appliance Co. ..... 530 E Ave., W., Cedar Rapids, Ia.

Kalamazoo Loose Leaf Binder Co. ..... Kalamazoo, Mich.
Kane Manufacturing Co. Inc., Wm. ..... 1903-15 E. Hagert St., Philadelphia, Pa.

Kemp Mfg. Co., The C. M. ..... 405 E. Oliver St., Baltimore, Md.
Kidde & Co. ..... 103 Park Ave., New York, N. Y.
Kitson Co. ..... 2815 Oakford St., Philadelphia, Pa.
Kompak Co., The ..... New Brunswick, N. J.
Koppers Co., The ..... Union Arcade, Pittsburgh, Pa.

Lambert Meter Co. Inc. ..... Bush Terminal, Bldg. No. 4, Brooklyn, N. Y.
Lattimer Stevens Co., The ..... 72 Yale Ave., Columbus, O.
Lawrence Leather Co., A. C. ..... 210 South St., Boston, Mass.
Lawson Mfg. Co. ..... 300 Lexington Ave., Pittsburgh, Pa.
Leeds & Northrup Company ..... 4901 Stanton Ave., Philadelphia, Pa.
Lindsay Light Co. ..... 161 E. Grand Ave., Chicago, Ill.
Logan County Coal Corp. ..... 2015 Union Central Bldg., Cincinnati, O.
Lovekin Water Heater Co., The ..... 39 Laurel St., Philadelphia, Pa.
Ludlow Valve Mfg. Co., The ..... Foot of Adams St., Troy, N. Y.
Lungmotor Corporation ..... 180 N. Market St., Chicago, Ill.
Lyon, Eph. ..... Trust Bldg., Franklin, Pa.

McClary Manufacturing Co., The ..... London, Canada
McDonald & Co., D. ..... 991 Broadway, Albany, N. Y.
McRae & Roberts Co., The ..... 100 S. Campbell Ave., Detroit, Mich.
Magee Furnace Co. ..... 38 Union St., Boston, Mass.
Malleable Iron Range Co. ..... Beaver Dam, Wis.
Maryland Meter Works ..... Holliday & Saratoga Sts., Baltimore, Md.
Maxon Furnace & Engineering Co. ..... Muncie, Ind.
Meek Oven Mfg. Co. ..... Westport, Conn.
Metcalfe-Shaw Corp. ..... 811 Railroad Ave., S., Seattle, Wash.
Metric Metal Works ..... 10th & Payne Aves., Erie, Pa.
Meyercord Co., The ..... Chamber of Commerce Bldg., Chicago, Ill.
Michigan Ammonia Works ..... Foot of Meldrum Ave., Detroit, Mich.
Michigan Stove Co., The ..... 3306 E. Jefferson Ave., Detroit, Mich.
Milwaukee Gas Specialty Co. ..... 2015 Clybourn St., Milwaukee, Wis.
Mine Safety Appliances Co. ..... Chamber of Commerce Bldg., Pittsburgh, Pa.
Missouri Fire Brick Co. ..... Security Bldg., St. Louis, Mo.
Moffats Ltd. ..... Weston, Ont., Can.
Monarch Engineering & Mfg. Co., The ..... 1206 American Bldg., Baltimore, Md.
Mueller Manufacturing Co., H. ..... Decatur, Ill.

National Machine Works ..... 1559 Sheffield Ave., Chicago, Ill.
National Stove Co. Div. ..... Lorain, O.
National Tube Co. ..... Frick Bldg., Pittsburgh, Pa.
New Process Stove Co. Div ..... 4301 Perkins Ave., Cleveland, O.
New York Gas Tubing Co., Inc. ..... 806 Greenwich St., New York, N. Y.
1900 Washer Co., The ..... Binghamton, N. Y.

Ofeldt Gas Fired Boiler Co., The ..... Foot of Main St., Nyack, N. Y.
Ohio State Stove Co. ..... Columbus, O.
Old Ben Coal Corporation ..... Illinois Merchant Bank Bldg., 230 S. Clark St., Chicago, Ill.

Parker-Russell Mining & Mfg. Co. ..... Laclede Gas Bldg., St. Louis, Mo.
Peerless Heater Co. ..... 5602 Baum Blvd., Pittsburgh, Pa.
Peerless Mfg. Co., The ..... 15th & Ormsby Row, Louisville, Ky.
Peninsular Brass Works ..... W. Warren & Walton Aves., Detroit, Mich.
Peninsular Stove Co., The ..... Fort St., W., Detroit, Mich.
Philadelphia Stove Co. ..... 1631 N. 5th St., Philadelphia, Pa.
Phillips & Clark Stove Co. Inc. ..... Geneva, N. Y.
Phillips, Lang & Co. ..... 538 S. Dearborn St., Chicago, Ill.
Pittsburgh Meter Co. ..... Braddock & Cable Aves., East Pittsburgh, Pa.
Pittsburg Water Heater Co. ..... Box 1109, Pittsburgh, Pa.
Porcelain Enamel & Mfg. Co. ..... 8th & O'Donnell Sts., Baltimore, Md.
Precision Instrument Co. ..... 21 Halsey St., Newark, N. J.
Protecto Safety Appliance Co. ..... 50 Columbia St., Newark, N. J.

Quick Meal Stove Co. Div. ..... 825 Chouteau Ave., St. Louis, Mo.
Quigley Furnace Specialties Co. ..... 26 Cortlandt St., New York, N. Y.

Radiant Heat Corporation of America ..... 126 Eleventh Ave., New York, N. Y.
Rathbone, Sard & Co. ..... Aurora, Ill.
Reliable Stove Co. Div. ..... 1787 E. 40th St., Cleveland, O.
Remington Typewriter Co. Inc. ..... 374 Broadway, New York, N. Y.

Republic Flow Meters Co. ..... 2240 Diversey Blvd., Chicago, Ill.
Reynolds Gas Regulator Co. ..... Anderson, Ind.
Reznor Manufacturing Co. ..... Mercer, Pa.
Riter Conley Co. ..... Box 939, Pittsburgh, Pa.
Roberts Brass Mfg. Co., The ..... 5435 Fort St., W., Detroit, Mich.
Roberts & Mander Stove Co. ..... 11th & Washington Aves., Philadelphia, Pa.
Robertshaw Thermostat Co. ..... Youngwood, Pa.
Roper Corp., Geo. D. ..... Rockford, Ill.
Rotary Meter Co. ..... 52 Vanderbilt Ave., New York, N. Y.
Russell Engineering Company ..... 1624 Railway Exchange Bldg., St. Louis, Mo.
Ruud Manufacturing Co. ..... 29th & Smallman Sts., Pittsburgh, Pa.
Ryan Co., B. ..... 366-372 W. 15th St., New York, N. Y.

Safety Gas Lighter Co. ..... Lynn, Mass.
Safety Gas Main Stopper Co. ..... 523 Atlantic Ave., Brooklyn, N. Y.
Sands Manufacturing Co., The ..... 5407 Sweeney Ave., Cleveland, O.
Schaeffer & Budenberg Mfg. Co., The ..... 338 Berry St., Brooklyn, N. Y.
Schmidt Co., G. F. ..... 1338 Carmen Ave., Chicago, Ill.
Scott Gas Appliance Co., Inc. ..... 5 Thomas Circle, Washington, D. C.
Security Stove & Manufacturing Co. ..... 17th & Oakland Ave., Kansas City, Mo.
Selas Co., The ..... 940 N. Front St., Philadelphia, Pa.
Semet-Solvay Co. ..... Syracuse, N. Y.
Sexton Stove & Mfg. Co., The S. B. ..... 500 Block W. Conway St., Baltimore, Md.
Sharples Specialty Co., The ..... 501 Fifth Ave., New York, N. Y.
Sheet Metal Specialty Co. ..... 3rd & Liberty Aves., Pittsburgh, Pa.
Sherwood Co., J. M. ..... 44 Murray St., New York, N. Y.
Slattery & Bro., Inc., J. B. ..... 119 Sanford St., Brooklyn, N. Y.
Somerville Stove Works ..... Somerville, N. J.
S O S Welding Corp. ..... 235 Sixth St., Brooklyn, N. Y.
Sprague Meter Co., The ..... 35 South Ave., Bridgeport, Conn.
Stacey Bros. Gas Construction Co., The ..... 5535 Carthage Pike, Cincinnati, O.
Stacey Manufacturing Co., The ..... Elmwood Place, Cincinnati, O.
Standard Brass Works ..... 2931 Wight St., Detroit, Mich.
Standard Chemical & Supply Co. ..... 172 Second St., Cambridge A, Mass.
Steere Engineering Co. ..... General Motors Bldg., Detroit, Mich.
Steiner & Co., Inc., E. E. ..... 2-16 Avenue C, Newark, N. J.
Stephens-Adamson Mfg. Co. ..... Aurora, Ill.
Storrs Mica Co. ..... 117 Front St., Owego, N. Y.
Strait & Richards Inc. ..... Fabyan Pl. & Selvage St., Newark, N. J.
Strause Gas Iron Co. ..... 1425 Vine St., Philadelphia, Pa.
Sturtevant Co., B. F. ..... Damon St., Boston, Mass.
Sunshine-Jasper Co., Inc. ..... 59 East Eighth St., New York, N. Y.
Superbo Manufacturing Co. ..... 1654 Long Beach Ave., Los Angeles, Calif.
Superior Laboratories ..... 28-30 Ionia St., S. W., Grand Rapids, Mich.
Superior Manufacturing Co., The ..... Liverpool & Oxline Sts., Pittsburgh, Pa.
Superior Meter Co. ..... Bush Terminal Bldg. No. 2, Brooklyn, N. Y.
Surface Combustion Co., The ..... 366 Gerard Ave., Bronx, N. Y.

Tallman, Robbins & Co. ..... 314 W. Superior St., Chicago, Ill.
Tappan Stove Co., The ..... Mansfield, O.
Tinnerman Stove & Range Co. ..... 2038 Fulton Rd., Cleveland, O.
Titeflex Metal Hose Co. ..... Badger Ave. & Runyon St., Newark, N. J.
Trenkamp Stove & Mfg. Co., The ..... 9806 Quincy St., Cleveland, O.
Tufts Meter Works, Nathaniel ..... 455 Commercial St., Boston, Mass.

Union Steel Products Co. Ltd. ..... Albion, Mich.
Union Stove Works ..... 70 Beekman St., New York, N. Y.
U. G. I. Contracting Co., The ..... Broad & Arch Sts., Philadelphia, Pa.
United Lead Co. ..... 111 Broadway, New York, N. Y.
United States Refractories Co. ..... Mount Union, Pa.
United Utilities & Engineering Corp. ..... Lansdale, Pa.

Van Zandt Gas Appliance Co. ..... 4050 Olive St., St. Louis, Mo.
Vesta Gas Range & Mfg. Co. ..... Chattanooga, Tenn.

Wales Co., The ..... Kalamazoo, Mich.
Walker & Pratt Mfg. Co. ..... 31 Union St., Boston, Mass.
Wehrle Co., The ..... 550 Wehrle Ave., Newark, O.

(Continued on page 372)

Classified Directory

Note—For complete address of firms, see index of manufacturer company members.

AGITATORS
- Bartlett Hayward Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

Benzol
- Belgian American Coke Ovens Corp.
- Koppers Co.
- Western Gas Construction Co.

AMMONIA

Liquor Concentrators
- Bartlett Hayward Co.
- Belgian American Coke Ovens Corp.
- Gas Machinery Co.
- Isbell-Porter Co.
- Koppers Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

Recovery Apparatus
- Bartlett Hayward Co.
- Belgian American Coke Ovens Corp.
- Gas Machinery Co.
- Isbell-Porter Co.
- Koppers Co.
- Michigan Ammonia Works
- Stacey Mfg. Co.
- Western Gas Construction Co.

Ammonia & Sulphur Apparatus
- Belgian American Coke Ovens Corp.
- Gas Machinery Co.
- Isbell-Porter Co.
- Western Gas Construction Co.

AMMONIUM SULPHATE PRODUCTION APPARATUS (without Sulphuric Acid)
- Bartlett Hayward Co.
- Belgian American Coke Ovens Corp.
- Gas Machinery Co.
- Koppers Co.
- Western Gas Construction Co.

ANALYZERS

Flue Gas
- Bacharach Industrial Instrument Co.
- Foxboro Co., Inc.
- Precision Instrument Co.
- Republic Flow Meters Co.
- Schaeffer & Budenberg Mfg. Co.

Gas
- Foxboro Co., Inc.
- Precision Instrument Co.
- Schaeffer & Budenberg Mfg. Co.

ANNEALERS (Bar, Blank, Strip)
- American Gas Furnace Co.

ANTI-FLUCTUATORS
- American Meter Co. Inc.
- U. G. I. Contracting Co.

APPARATUS, EXPERIMENTAL GAS
- American Gas Furnace Co.
- American Meter Co. Inc.

APPRAISALS & VALUATIONS
- Davis & Farnum Mfg. Co.
- U. G. I. Contracting Co.

AQUA AMMONIA APPARATUS
- Bartlett Hayward Co.
- Gas Machinery Co.
- Isbell-Porter Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

ASBESTOS & MAGNESIA PRODUCTS
- Johns-Manville Inc.

BAGS, GAS MAIN
- American Meter Co. Inc.
- Connelly Iron Sponge & Governor Co.

BAROMETERS
- American Meter Co. Inc.
- Connelly Iron Sponge & Governor Co.
- Precision Instrument Co.
- Schaeffer & Budenberg Mfg. Co.

BENCHES
- American Gas Construction Co.
- Gas Machinery Co.
- Gautier & Co., J. H.
- Improved Equipment Co.
- Isbell-Porter Co.
- Missouri Fire Brick Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Stacey Mfg. Co.
- U. G. I. Contracting Co.

BENCH IRON WORK
- American Gas Construction Co.
- Banner Iron Works
- Bartlett Hayward Co.
- Davis & Farnum Mfg. Co.
- Gas Machinery Co.
- Improved Equipment Co.
- Isbell-Porter Co.
- Missouri Fire Brick Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

BENZOL RECOVERY APPARATUS
- Bartlett Hayward Co.
- Koppers Co.
- Western Gas Construction Co.

BINS, STORAGE (Ash, Coal, Coke)
- Bartlett Hayward Co.
- Beaumont Co., R. H.
- Cruse-Kemper Co.
- Davis & Farnum Mfg. Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Stacey Bros. Gas Construction Co.
- Stacey Mfg. Co.
- U. G. I. Contracting Co.
- Western Gas Construction Co.
- Young Brothers Co.

BLAST GATES
- American Gas Construction Co.
- Monarch Engineering & Mfg. Co.
- Steere Engineering Co.
- Sturtevant Co. Inc., B. F.
- U. G. I. Contracting Co.
- Western Gas Construction Co.

BLOCKS & TILES, FIRE CLAY
- American Gas Construction Co.
- Gas Machinery Co.
- Gautier & Co., J. H.
- Improved Equipment Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Strait & Richards Inc.
- U. G. I. Contracting Co.

BLOWERS & BOOSTERS
- American Gas Construction Co.
- American Gas Furnace Co.
- Combustion Utilities Corp.
- Connelly Iron Sponge & Governor Co.
- Connersville Blower Co.
- Gas Engineering Co.
- Gas Machinery Co.
- Kemp Mfg. Co., C. M.
- Maxon Furnace & Engineering Co.
- Monarch Engineering & Mfg. Co.
- Parker-Russell Mining & Mfg. Co.
- Russell Engineering Co.
- Selas Co.
- Sturtevant Co., B. F.
- Sunshine-Jasper Co. Inc.
- Surface Combustion Co.
- U. G. I. Contracting Co.
- Wales Co.
- Western Gas Construction Co.
- Wilbraham-Green Blower Co.

BLOW-PIPES
American Gas Furnace Co.
BOILERS, GAS-FIRED
Industrial
Bastian-Morley Co.
Blodgett Co., G. S.
Bryant Heater & Mfg. Co.
Combustion Utilities Corp.
Crane Co., Wm. M.
Gallaher Boiler Co.
General Gas Appliance Co.
Kane Mfg. Co. Inc., Wm.
Kidde & Co.
National Machine Works
Ofeldt Gas Fired Boiler Co. Inc.
Peerless Heater Co.
United Utilities & Engineering Corp.
Wales Co.
House Heating
American Radiator Co.
Bartlett & Co. Inc.
Bastian-Morley Co.
Bryant Heater & Mfg. Co.
Gallaher Boiler Co.
Gas Utilities Corp.
General Gas Appliance Co.
Kane Mfg. Co. Inc., Wm.
Kidde & Co.
National Machine Works
Peerless Heater Co.
United Utilities & Engineering Corp.
Laundry
Hugo Mfg. Co.
BOILERS, WASTE HEAT
American Gas Construction Co.
Bartlett Hayward Co.
Gas Engineering Co.
Gas Machinery Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
BOXES
Curb, Roadway
Hays Mfg. Co.
Purifier
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
U. G. I. Co.
Western Gas Construction Co.
Service
Davis & Farnum Mfg. Co.
Grinnell Co. Inc.
Hays Mfg. Co.
Mueller Mfg. Co., H.
BRAKE & FRICTION MATERIALS
Johns-Manville Inc.
BRAZING TABLES
American Gas Furnace Co.
Combustion Utilities Corp.
BREECHING, BOILER & STACK
Bartlett Hayward Co.
Cruse-Kemper Co.
Riter-Conley Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
Young Brothers Co.
BRICK, FIREBRICK
American Gas Construction Co.
Gas Machinery Co.
Gautier & Co., J. H.
Harbison-Walker Refractories Co.
Improved Equipment Co.
Missouri Fire Brick Co.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Russell Engineering Co.
U. G. I. Contracting Co.
United States Refractories Corp.
Western Gas Construction Co.
BROILERS, HOTEL
Clark & Co., Geo. M.
Crane Co., Wm. M.
Detroit Stove Works
Fuller-Warren Co.
General Gas Appliance Co.
McClary Mfg. Co.
Michigan Stove Co.
Quick Meal Stove Co. Div.
Rathbone, Sard & Co.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Union Steel Products Co. Ltd.
BUILDINGS, STEEL
Bartlett Hayward Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
BUNKERS, STEEL & CONCRETE
Bartlett Hayward Co.
Beaumont Co., R. H.
Cruse-Kemper Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
BURNERS
Industrial
American Gas Appliance Co.
American Gas Furnace Co.
Baltimore Gas Appliance & Mfg. Co.
Century Stove & Mfg. Co.
Combustion Utilities Corp.
Crane Co., Wm. M.
Equitable Meter Co.
Franklin Sales & Burner Mfg. Co.
Fuller-Warren Co.
Gehnrich Indirect Heat Oven Co.
General Gas Appliance Co.
Grinnell Co., Inc.
Hale Mfg. Co.
Hones, Inc., Charles A.
Hugo Mfg. Co.
Johnson Gas Appliance Co.
Kane Mfg. Co. Inc., Wm.
Kemp Mfg. Co., The C. M.
McClary Mfg. Co.
Maxon Furnace & Engineering Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Roper Corp., Geo. D.
Schmidt, G. F.
Selas Co.
Surface Combustion Co.
Tappan Stove Co.
Wales Co.
Wolff Gas Radiator Co., A. H.
Young Brothers Co.
Lighting
Crane Co., Wm. M.
Lindsay Light Co.
Welsbach Co.
BY-PRODUCT RECOVERY APPARATUS
Bartlett Hayward Co.
Foundation Oven Corp.
Gas Machinery Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Semet-Solvay Co.
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
CALORIMETER ACCESSORIES
American Meter Co. Inc.
Connelly Iron Sponge & Governor Co.
Lambert Meter Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
CALORIMETERS
American Meter Co. Inc.
Connelly Iron Sponge & Governor Co.
Cutler-Hammer Mfg. Co.
Griffin & Co., John J.
McDonald & Co., D.

Maryland Meter Works
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel
Recording Gas
Cutler-Hammer Mfg. Co.
Precision Instrument Co.
Coal & Gas
American Meter Co., Inc.
Connelly Iron Sponge & Governor Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

CASES, METER
American Meter Co., Inc.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Pittsburgh Meter Co.
Sprague Meter Co.

CASING & TUBING (Steel)
National Tube Co.

CASTINGS
Brass
Baltimore Gas Appliance & Mfg. Co.
Crane Co., Wm. M.
Grinnell Co. Inc.
Metric Metal Works
National Machine Works
Robertshaw Thermostat Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Wehrle Co.
Western Gas Construction Co.
Gray Iron
Baltimore Gas Appliance & Mfg. Co.
Bartlett Hayward Co.
Cleveland Co-Operative Stove Co.
Crane Co., Wm. M.
Davis & Farnum Mfg. Co.
Erie Stove & Mfg. Co.
Grinnell Co. Inc.
Home Stove & Foundry Co.
Howard Stove Co.
Isbell-Porter Co.
National Machine Works
Russell Engineering Co.
Security Stove & Mfg. Co.
Sexton Stove & Mfg. Co., S. B.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Wehrle Co.
Western Gas Construction Co.
Pipe & Specials
Banner Iron Works
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Grinnell Co. Inc.
Isbell-Porter Co.
National Machine Works
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
Western Gas Construction Co.

CEMENT
High Temperature
Gautier & Co., J. H.
Improved Equipment Co.
Johns-Manville Inc.
Missouri Fire Brick Co.
Monarch Engineering & Mfg. Co.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Russell Engineering Co.
U. G. I. Contracting Co.
Roof
Johns-Manville Inc.

CHARGING MACHINES (Retort, Through Retort, Combined Charging and Discharging)
Bartlett Hayward Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Parker-Russell Mining & Mfg. Co.
Phillips, Lang & Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Mfg. Co.
West Gas Improvement Co. of America, Inc.

CHEMICAL & GAS TESTING APPARATUS
Connelly Iron Sponge & Governor Co.
Precision Instrument Co.
U. G. I. Contracting Co.

CHEMICAL APPARATUS (Lead Lined)
United Lead Co.

CHIMNEYS, RADIAL BRICK
Alphons Custodis Chimney Construction Co.
Russell Engineering Co.

CHUTES (Coal, Coke, Ash)
American Gas Construction Co.
Beaumont Co., R. H.
Cruse-Kemper Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Mfg. Co.
Western Gas Construction Co.

CLAMPS & SLEEVES, PIPE
Davis & Farnum Mfg. Co.
Dresser Mfg. Co., S. R.
Grinnell Co. Inc.
National Machine Works
Steere Engineering Co.

CLAMPS, SERVICE
Hays Mfg. Co.
Mueller Mfg. Co., H.
Safety Gas Main Stopper Co.

CLEANERS, SERVICE
Lambert Meter Co.
Superior Meter Co.

COAL
Logan County Coal Corp.
Harlan Co-Operative Coal Co.
Old Ben Coal Corp.

COAL TAR PRODUCTS & CHEMICALS
Barrett Co.
Parker-Russell Mining & Mfg. Co.
Semet Solvay Co.

COCKS
Gas Engine
Claus Automatic Gas Cock Co.
Hays Mfg. Co.
Standard Brass Works
Lighting
Standard Brass Works
Range & Water Heater
A-B Stove Co.
Acme Brass Works
Ajax Brass & Iron Co.
Claus Automatic Gas Cock Co.
Combustion Utilities Corp.
Detroit Brass & Malleable Works
General Gas Appliance Co.
Grinnell Co. Inc.
Hays Mfg. Co.
Johnson Gas Appliance Co.
Lattimer Stevens Co.
McRae & Roberts Co.
Mueller Mfg. Co., H.
Peninsular Brass Works
Roberts Brass Mfg. Co.
Roper Corp., Geo. D.
Standard Brass Works
Service & Meter
A-B Stove Co.
Ajax Brass & Iron Co.
Claus Automatic Gas Cock Co.
Combustion Utilities Corp.
Detroit Brass & Malleable Works
General Gas Appliance Co.
Grinnell Co. Inc.
Hays Mfg. Co.
Johnson Gas Appliance Co.
Kitson Co.
Lattimer Stevens Co.
Mueller Mfg. Co., H.
Peninsular Brass Works
Roberts Brass Mfg. Co.

COILS, COPPER
Pittsburg Water Heater Co.

COLLECTORS, DUST
Sturtevant Co., B. F.

COMPOUNDS FOR CLEANING GAS METERS & RANGES
Detroit Stove Works
Lambert Meter Co.
Standard Chemical & Supply Co.

COMPRESSORS
- American Gas Construction Co.
- Combustion Utilities Corp.
- Connelly Iron Sponge & Governor Co.
- Parker-Russell Mining & Mfg. Co.
- Surface Combustion Co.
- Western Gas Construction Co.

Gas
- American Gas Construction Co.
- Russell Engineering Co.
- Selas Co.
- Surface Combustion Co.
- Western Gas Construction Co.

CONCENTRATORS, AMMONIA
- Bartlett Hayward Co.
- Gas Machinery Co.
- Isbell-Porter Co.
- Koppers Co.
- Michigan Ammonia Works
- Stacey Mfg. Co.
- Western Gas Construction Co.

CONDENSERS
- American Gas Construction Co.
- Bartlett Hayward Co.
- Cruse-Kemper Co.
- Davidson Co., M. T.
- Davis & Farnum Mfg. Co.
- Gas Engineering Co.
- Gas Machinery Co.
- Isbell-Porter Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Stacey Bros. Gas Construction Co.
- Stacey Mfg. Co.
- Steere Engineering Co.
- U. G. I. Contracting Co.
- Western Gas Construction Co.

CONNECTIONS & SEALS, METER
- American Meter Co., Inc.
- Cleveland Gas Meter Co.
- Dresser Mfg. Co., S. R.
- Equitable Meter Co.
- Griffin & Co., John J.
- Helme & McIlhenny
- Lambert Meter Co.
- Lattimer Stevens Co.
- Maryland Meter Works
- D. McDonald & Co.
- Metric Metal Works
- Mueller Mfg. Co., H.
- Pittsburgh Meter Co.
- Sprague Meter Co.
- Superior Meter Co.
- Tufts Meter Works, Nathaniel

CONTROLLERS

Air & Gas Automatic
- American Gas Furnace Co.
- Robertshaw Thermostat Co.

Heat
- American Gas Furnace Co.
- Bristol Co.

Humidity, Pressure, Temperature
- Foxboro Co.

Oven Heat
- Robertshaw Thermostat Co.

CONTROLLING DEVICES, ELECTRIC
- Connelly Iron Sponge & Governor Co.
- Cutler-Hammer Mfg. Co.

For House Heating
- American Radiator Co.

CONTROLS, AIR & STEAM
- U. G. I. Contracting Co.

COOKERS, DOMESTIC
- Baltimore Gas Appliance & Mfg. Co.
- Crane Co., Wm. M.
- McClary Mfg. Co.
- Reliable Stove Co. Div.
- Roper Corp., Geo. D.
- Tappan Stove Co.

COOKING AUXILIARIES
- Blodgett Co., G. S.
- Combustion Utilities Corp.
- Commercial Gas Appliance Co.
- Crane Co., Wm. M.
- Duparquet, Huot & Moneuse Co.
- Fuller-Warren Co.
- General Gas Appliance Co.
- Johnson Gas Appliance Co.
- McClary Mfg. Co.
- Roper Corp., Geo. D.
- Scott Gas Appliance Co.

COOLERS
- Bartlett Hayward Co.
- Stacey Bros. Gas Construction Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

COOLING SYSTEMS
- Bartlett Hayward Co.
- Improved Equipment Co.
- Stacey Mfg. Co.

COUNTERS, REVOLUTION
- Bailey Meter Co.
- Bristol Co.
- Foxboro Co., Inc.
- Schaeffer & Budenberg Mfg. Co.

COUPLINGS
- Bartlett Hayward Co.
- Claus Automatic Gas Cock Co.
- Connersville Blower Co.
- Dresser Mfg. Co., S. R.
- Pittsburgh Meter Co.

Range, Boiler, Pipe
- Pittsburg Water Heater Co.

COVERINGS (Tank, Boiler, Cold & Steam Pipe)
- Armstrong Cork & Insulation Co.
- Johns-Manville Inc.

CRANES
- Gas Machinery Co.
- Young Brothers Co.

CUBIC FOOT BOTTLE
- American Meter Co. Inc.
- Equitable Meter Co.
- Superior Meter Co.

CYLINDERS
- Davis & Farnum Mfg. Co.
- National Machine Works
- Riter-Conley Co.
- S O S Welding Corp.
- Stacey Mfg. Co.
- Western Gas Construction Co.

DECALCOMANIA PRODUCTS
- Eriez Stove & Mfg. Co.
- Meyercord Co. Inc.

DERRICKS, TRENCH
- Safety Gas Main Stopper Co.

DETERMINATORS, MOISTURE
- U. G. I. Contracting Co.

DIAPHRAGMS, METER
- Lambert Meter Co.
- Lawrence Leather Co., A. C.

DIGESTERS
- Riter-Conley Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

DISCHARGING MACHINES (Retort & Through Retort)
- Bartlett Hayward Co.
- Gas Machinery Co.
- Improved Equipment Co.
- Isbell-Porter Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Stacey Mfg. Co.
- West Gas Improvement Co. of America, Inc.

DISPLACEMENT SYSTEM, TAR
- Bartlett Hayward Co.
- Gas Machinery Co.
- Parker-Russell Mining & Mfg. Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

DOMESTIC SCIENCE EQUIPMENT
- McClary Mfg. Co.
- Roper Corp., Geo. D.
- Stacey Mfg. Co.

DOOR, CLEAN OUT
- Bartlett Hayward Co.
- Davis & Farnum Mfg. Co.
- Gas Machinery Co.
- Isbell-Porter Co
- National Machine Works
- Parker-Russell Mining & Mfg. Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

DRUMS, STATION METER
American Meter Co.
DRYERS
Riter-Conley Co.
Stacey Mfg. Co.
Clothes
Canton Clothes Dryer Co.
General Gas Appliance Co.
Sturtevant Co., B. F.
ECONOMIZERS, FUEL
Improved Equipment Co.
Russell Engineering Co.
Selas Co.
Sturtevant Co., B. F.
ELEVATORS
Beaumont Co., R. H.
Phillips, Lang & Co.
U. G. I. Contracting Co.
ENGINEERS & ENGINEERING SERVICE
American Gas Construction Co.
Bartlett Hayward Co.
Beaumont Co., R. H.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Gautier & Co., J. H.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
Missouri Fire Brick Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Semet-Solvay Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
West Gas Improvement Co. of America, Inc.
ENGINES
Gas
Bartlett Hayward Co.
Sturtevant Co., B. F.
Steam
Sturtevant Co., B. F.
Steam, Uniflow & Counter-flow
Harrisburg Foundry & Machine Works
EVAPORATING APPARATUS
Bartlett Hayward Co.
Stacey Mfg. Co.
EXCHANGERS, HEAT
Bartlett Hayward Co.
Cruse-Kemper Co.
Riter-Conley Co.
Western Gas Construction Co.
EXHAUSTERS
American Gas Construction Co.
American Gas Furnace Co.
Combustion Utilities Corp.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Gas Engineering Co.
Gas Machinery Co.
Isbell-Porter Co.
Kemp Mfg. Co., C. M.
Maxon Furnace Engineering Co.
Monarch Engineering & Mfg. Co.
Stacey Bros. Gas Construction Co.
Sturtevant Co., B. F.
Surface Combustion Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
Wilbraham-Green Blower Co.
EXPERIMENTAL APPARATUS
American Meter Co. Inc.
Lambert Meter Co.
Precision Instrument Co.
Russell Engineering Co.
Superior Meter Co.
Western Gas Construction Co.
EXTRACTORS
Dust & Fumes
Gas Engineering Co.
Gas Machinery Co.
Isbell-Porter Co.
Parker-Russell Mining & Mfg. Co.
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
Tar
Bartlett Hayward Co.
Connelly Iron Sponge & Governor Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Isbell-Porter Co.
Russell Engineering Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
FANS
Sturtevant Co., B. F.
FAUCETS, DRAIN
Standard Brass Works
FILTERING FLUE, GAS RANGE
Commercial Gas Appliance Co.
FIRE CLAY & PRODUCTS
American Gas Construction Co.
Gautier & Co., J. H.
Improved Equipment Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
FIRST AID EQUIPMENT
Connelly Iron Sponge & Governor Co.
U. G. I. Contracting Co.
FITTINGS
A-B Stove Co.
Acme Brass Works
Ajax Brass & Iron Co.
Bartlett Hayward Co.
Banner Iron Works
Claus Automatic Gas Cock Co.
Combustion Utilities Corp.
Crane Co.
Davis & Farnum Mfg. Co.
Detroit Brass & Malleable Works
Dresser Mfg. Co., S. R.
Eriez Stove & Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Grinnell Co. Inc.
Isbell-Porter Co.
Kitson Co.
McRae & Roberts Co.
Mueller Mfg. Co., H.
Peninsular Brass Works
Roberts Brass Mfg. Co.
Roper Corp., Geo. D.
Standard Brass Works
Steere Engineering Co.
Welsbach Co.
Western Gas Construction Co.
Brass
Ajax Brass & Iron Co.
Claus Automatic Gas Cock Co.
Superior Meter Co.
Malleable Iron
Crane Co.
Davis & Farnum Mfg. Co.
Detroit Brass & Malleable Works
Eriez Stove & Mfg. Co.
Lambert Meter Co.
Roper Corp., Geo. D.
Superior Meter Co.
Street Main
Banner Iron Works
FIXTURES, LIGHTING (Domes, Portables, etc.)
General Gas Light Co.
Welsbach Co.
FLASHLIGHTS & BATTERIES
Connelly Iron Sponge & Governor Co.
French Battery & Carbon Co.
Welsbach Co.
FLOORING, INDUSTRIAL
Gas Machinery Co.
Johns-Manville Inc.
FLOORS
Iron
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Isbell-Porter Co.
Parker-Russell Mining & Mfg. Co.
Stacey Mfg. Co.

U. G. I. Contracting Co.
Western Gas Construction Co.
Steel
Young Brothers Co.

FORGES, GAS-FIRED
Blacksmith
American Gas Furnace Co.
National Machine Works
Surface Combustion Co.
Bolt Heading
American Gas Furnace Co.
National Machine Works
Surface Combustion Co.
Rivet Heating
American Gas Furnace Co.
Combustion Utilities Corp.
National Machine Works
Surface Combustion Co.
Tool Room
Combustion Utilities Corp.
Monarch Engineering & Mfg. Co.
National Machine Works
Sturtevant Co., B. F.
Surface Combustion Co.

FRYERS, DOUGHNUT & CRULLER
Blodgett Co. Inc., G. S.
Combustion Utilities Corp.
Crane Co., Wm. M.
McClary Mfg. Co.

FURNACES
American Gas Furnace Co.
Combustion Utilities Corp.
Century Stove & Mfg. Co.
Eriez Stove & Mfg. Co.
Estate Stove Co.
Hones, Inc., Charles A.
Johnson Gas Appliance Co.
Kemp Mfg. Co., C. M.
Maxon Furnace & Engineering Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Russell Engineering Co.
Parker-Russell Mining & Mfg. Co.
Security Stove & Mfg. Co.
Sexton Stove & Mfg. Co., S. B.
Superior Mfg. Co.
Surface Combustion Co.
Young Brothers Co.
Air Tempering
American Gas Furnace Co.
National Machine Works
Annealing
American Gas Furnace Co.
Combustion Utilities Corp.
Johnson Gas Appliance Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Surface Combustion Co.
Assaying
American Gas Furnace Co.
Monarch Engineering & Mfg. Co.
Surface Combustion Co.
Case Hardening
American Gas Furnace Co.
Johnson Gas Appliance Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Russell Engineering Co.
Surface Combustion Co.
Cauldron
American Gas Furnace Co.
Combustion Utilities Corp.
National Machine Works
Surface Combustion Co.
Confectioners
American Gas Furnace Co.
Combustion Utilities Corp.
Crane Co., Wm. M.
National Machine Works
Surface Combustion Co.
Crucible
American Gas Furnace Co.
Johnson Gas Appliance Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Surface Combustion Co.
Cyanide & Hardening
American Gas Furnace Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Surface Combustion Co.
Enameling
American Gas Furnace Co.
Monarch Engineering & Mfg. Co.
Porcelain Enamel & Mfg. Co.
Surface Combustion Co.
Forging
American Gas Furnace Co.
Combustion Utilities Corp.
Monarch Engineering & Mfg. Co.
National Machine Works
Surface Combustion Co.
Galvanizing
American Gas Furnace Co.
Monarch Engineering & Mfg. Co.
Gas Blast
American Gas Furnace Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Riter-Conley Co.
Surface Combustion Co.
Metal Melting & Heat Treating
American Gas Furnace Co.
Combustion Utilities Corp.
Johnson Gas Appliance Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Safety Gas Main Stopper Co.
Surface Combustion Co.
Muffle
American Gas Furnace Co.
Combustion Utilities Corp.
Monarch Engineering & Mfg. Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Surface Combustion Co.
Oven
American Gas Furnace Co.
Combustion Utilities Corp.
Monarch Engineering & Mfg. Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Surface Combustion Co.
Plating
American Gas Furnace Co.
Soldering
American Gas Furnace Co.
American Meter Co., Inc.
Crane Co., Wm. M.
Johnson Gas Appliance Co.
Monarch Engineering & Mfg. Co.
Roper Corp., Geo. D.
Surface Combustion Co.
Special
American Gas Furnace Co.
Combustion Utilities Corp.
Johnson Gas Appliance Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Surface Combustion Co.
Tempering
American Gas Furnace Co.
Combustion Utilities Corp.
Johnson Gas Appliance Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Surface Combustion Co.
Tinning
American Gas Furnace Co.
Combustion Utilities Corp.
Monarch Engineering & Mfg. Co.
National Machine Works
Surface Combustion Co.
Tool Dressing
American Gas Furnace Co.
Combustion Utilities Corp.
Monarch Engineering & Mfg. Co.
National Machine Works
Surface Combustion Co.

GAS ANALYSIS APPARATUS
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Connelly Iron Sponge & Governor Co.
Foxboro Co., Inc.
Precision Instrument Co.
U. G. I. Contracting Co.

GAS LEAK INDICATORS
Connelly Iron Sponge & Governor Co.
GASOMETER
Davis & Farnum Mfg. Co.
Stacey Mfg. Co.
Superior Meter Co.
Western Gas Construction Co.
GAUGES
American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Gas Machinery Co.
Griffin & Co., John J.
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
National Machine Works
Pittsburgh Meter Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel
U. G. I. Contracting Co.
Western Gas Construction Co.
Ammonia
Bristol Co.
Foxboro Co.
Differential
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Equitable Meter Co.
Foxboro Co., Inc.
National Machine Works
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Draft
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Foxboro Co., Inc.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
5 in 1, 4 in 1, 3 in 1, 2 in 1,
American Meter Co., Inc.
Bailey Meter Co.
Connelly Iron Sponge & Governor Co
Foxboro Co., Inc.,
Gas Machinery Co.
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Liquid Level
Foxboro Co., Inc.,
Republic Flow Meters Co.
Mercury
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Gas Machinery Co.
National Machine Works
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Pressure
American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Gas Machinery Co.
Griffin & Co., John J.
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
National Machine Works
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel
U. G. I. Contracting Co.
Western Gas Construction Co.
Pressure & Volume
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Schaeffer & Budenberg Mfg. Co.
Portable
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Recording
American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Equitable Meter Co.
Foxboro Co., Inc.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Single Tube
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Foxboro Co., Inc.
National Machine Works
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Siphon or "U" Tube
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc
Gas Machinery Co.
Lambert Meter Co.
National Machine Works
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Test
American Meter Co., Inc.
Bristol Co.
Foxboro Co., Inc.
Schaeffer & Budenberg Mfg. Co.
Vacuum
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Foxboro Co., Inc.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Water Column
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Foxboro Co., Inc
Gas Machinery Co.
National Machine Works
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
U. G. I. Contracting Co.
GENERATORS, WATER GAS
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.

Gas Machinery Co.
Isbell-Porter Co.
National Machine Works
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

GLASSWARE
Chemical
Precision Instrument Co.
Welsbach Co.
Lighting
General Gas Light Co.
Storrs Mica Co.
Welsbach Co.

GOVERNORS
American Gas Construction Co.
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Davis & Farnum Mfg. Co.
Equitable Meter Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
Lambert Meter Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Reynolds Gas Regulator Co.
Russell Engineering Co.
Selas Co.
Sprague Meter Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Boiler Gas Fuel
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
National Machine Works
By-Pass or Reverse Flow
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
Western Gas Construction Co.
District (High & Intermediate Pressure)
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
District (Low Pressure)
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Isbell-Porter Co.
Reynolds Gas Regulator Co.
Exhauster
Connelly Iron Sponge & Governor Co.
Isbell-Porter Co.
Western Gas Construction Co.
Fuel Gas or Coke Oven
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
Western Gas Construction Co.
Gas Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Davis & Farnum Mfg. Co.
Equitable Meter Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
National Machine Works
Reynolds Gas Regulator Co.
Selas Co.
Sprague Meter Co.
Western Gas Construction Co.
High, Low, Intermediate Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
Sprague Meter Co.
Retort House
Connelly Iron Sponge & Governor Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Isbell-Porter Co.
Russell Engineering Co.
Service, High, Low, Intermediate Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
National Machine Works
Reynolds Gas Regulator Co.
Sprague Meter Co.
Station
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Reynolds Gas Regulator Co.
Sprague Meter Co.
Street
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Isbell-Porter Co.
Reynolds Gas Regulator Co.

GRATE BARS, CAST IRON
Banner Iron Works

GRIDDLES, CAKE
Crane Co., Wm. M.
McClary Mfg. Co.
Roper Corp., Geo. D.

HAMMERS, CAULKING
Bartlett Hayward Co.
Safety Gas Main Stopper Co.

HANGERS, PIPE
Grinnell Co., Inc.
Stacey Mfg. Co.

HEATERS
Air
Combustion Utilities Corp.
McClary Mfg. Co.
National Machine Works
Roper Corp., Geo. D.
Sturtevant Co., B. F.
Tappan Stove Co.
Drying
Combustion Utilities Corp.
Gehnrich Indirect Heat Oven Co.
Fireplace
General Gas Light Co.
Grayson Mfg. Co., J. H.
Radiant Heat Corp. of America
Slattery & Bro., Inc., J. B.
Strait & Richards Inc.
Welsbach Co.
Wolff Gas Radiator Co., A. H.
Garage
American Radiator Co.
Cleveland Heater Co.
Estate Stove Co.
Gallaher Boiler Co.
Howard Stove Co.
Kidde & Co.
Phillips & Clark Stove Co., Inc.
Sexton Stove & Mfg. Co., S. B.
Sturtevant Co., B. F.
Superior Mfg. Co.
Tappan Stove Co.
Wales Co.
Wehrle Co.
Glue
Combustion Utilities Corp.
Crane Co., Wm. M.
National Machine Works
Indirect Gas Oven
Gehnrich Indirect Heat Oven Co., Inc.
Young Brothers Co.
Pressing & Soldering Iron
American Gas Furnace Co.
Combustion Utilities Corp.
Crane Co., Wm. M.
Estate Stove Co.
General Gas Appliance Co.
Hones Inc., Charles A.
Johnson Gas Appliance Co.
Kemp Mfg. Co., C. M.
Quick Meal Stove Co., Div.
Reliable Stove Co., Div.
Roper Corp., Geo. D.
Strait & Richards Inc.
Radiant
Century Stove & Mfg. Co.

Cleveland Co-Operative Stove Co.
Clow & Sons, James B.
Estate Stove Co.
General Gas Light Co.
Grayson Mfg. Co., J. H.
Guardian Gas Appliance Co.
McClary Mfg. Co.
Ohio State Stove & Mfg. Co.
Peerless Mfg. Co.
Pittsburg Water Heater Co.
Quick Meal Stove Co., Div.
Radiant Heat Corp. of America
Reliable Stove Co., Div.
Roberts & Mander Stove Co.
Slattery & Bro. Inc., J. B.
Sunshine-Jasper Co. Inc.
Wehrle Co.
Welsbach Co.
Wheeling Corrugating Co.
Wolff Gas Radiator Co., A. H.

Room
American Radiator Co.
American Stove Co.
Baltimore Gas Appliance & Mfg. Co.
Century Stove & Mfg. Co.
Clark & Co., Div., George M.
Cleveland Co-Operative Stove Co.
Clow & Sons, James B.
Crane Co., Wm. M.
Dangler Stove Co., Div.
Detroit Stove Works
Elgin Stove & Oven Co.
Eriez Stove & Mfg. Co.
Estate Stove Co.
General Gas Appliance Co.
General Gas Light Co.
Grinnell Co., Inc.
Guardian Gas Appliance Co.
Grayson Mfg. Co., J. H.
Hugo Mfg. Co.
Illinois Specialty Mfg. Co.
Kidde & Co.
Kompak Co.
Lawson Mfg. Co.
McClary Mfg. Co.
New Process Stove Co., Div.
Ohio State Stove & Mfg. Co.
Peerless Mfg. Co.
Phillips & Clark Stove Co., Inc.
Pittsburg Water Heater Co.
Quick Meal Stove Co., Div.
Radiant Heat Corp. of America
Reliable Stove Co., Div.
Reznor Mfg. Co.
Roberts & Mander Stove Co.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Slattery & Bro. Inc., J. B.
Strait & Richards Inc.
Sturtevant Co., B. F.
Van Zandt Gas Appliance Co.
Wehrle Co.
Welsbach Co.
Western Gas Construction Co.
Wheeling Corrugating Co.
Wolff Gas Radiator Co., A. H.

Wall
Van Zandt Gas Appliance Co.

HOISTS
Beaumont Co., R. H.
Safety Gas Main Stopper Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

HOLDERS
American Gas Construction Co.
Banner Iron Works
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Riter-Conley Co.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.

HOODS, RANGE
Crane Co., Wm. M.
McClary Mfg. Co.
Roper Corp., Geo. D.

HOPPERS
Bartlett Hayward Co.
Beaumont Co., R. H.
Riter-Conley Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.

HOT PLATES
American Stove Co.
A-B Stove Co.
Baltimore Gas Appliance & Mfg. Co.
Century Stove & Mfg. Co.
Clark & Co., Div., Geo. M.
Combustion Utilities Corp.
Crane Co., Wm. M.
Dangler Stove Co., Div.
Detroit Stove Works
Elgin Stove & Oven Co.
Eriez Stove & Mfg. Co.
Fuller-Warren Co.
General Gas Appliance Co.
Globe Stove & Range Co.
Howard Stove Co.
Johnson Gas Appliance Co.
McClary Mfg. Co.
Michigan Stove Co.
National Stove Co., Div.
New Process Stove Co., Div.
Ohio State Stove & Mfg. Co.
Peerless Mfg. Co.
Peninsular Stove Co.
Rathbone, Sard & Co.
Reliable Stove Co.
Roberts & Mander Stove Co.
Roper Corp., Geo. D.
Quick Meal Stove Co.
Slattery & Bro. Inc., J. B.
Tappan Stove Co
Union Stove Works
Wehrle Co.
Weir Stove Co.
Wheeling Corrugating Co.
Wolff Gas Radiator Co. A. H.

HYDROMETERS
Schaeffer & Budenberg Mfg. Co.

HYGROMETERS
Foxboro Co., Inc.
U. G. I. Contracting Co.

INCANDESCENT CLAY
Century Stove & Mfg. Co.
McClary Mfg. Co.

INCINERATORS
Estate Stove Co.
Guardian Gas Appliance Co.
Ruud Mfg. Co.

INDICATORS
Air Speed
Bacharach Industrial Instrument Co.
Foxboro Co., Inc
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
B.t.u.
U. G. I. Contracting Co.
CO
Bacharach Industrial Instrument Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
U. G. I. Contracting Co.
Draft
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Republic Flow Meters Co.
Engine
Bacharach Industrial Instrument Co.

INSTRUMENTS (Measuring, Testing & Recording)
American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Lambert Meter Co., Inc.
Leeds & Northrup Co.
Maryland Meter Works
Metric Metal Works

Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Steere Engineering Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel
U. G. I. Contracting Co.
Western Gas Construction Co.

INSULATING MATERIALS
American Gas Construction Co.
America Lava Corp.
Armstrong Cork & Insulation Co.
Cutler-Hammer Mfg. Co.
Davis & Farnum Mfg. Co.
Johns-Manville Inc.
Quigley Furnace Specialties Co.
Storrs Mica Co.

Oven & Water Heater
Johns-Manville Inc.

IRONS (Gas)
A-B Stove Co.
Benson Mfg. Co.
Crane Co., Wm. M.
General Gas Light Co.
Johnson Gas Appliance Co.
Milwaukee Gas Specialty Co.
Strause Gas Iron Co.
Sunshine-Jasper Co. Inc.
Welsbach Co.

JOINT RUNNERS
Safety Gas Main Stopper Co.

KETTLES

Confectioners
Combustion Utilities Corp.

Galvanizing
Riter-Conley Co.

Soda
Combustion Utilities Corp.
National Machine Works
Young Brothers Co.

Soup
Combustion Utilities Corp.
National Machine Works

KILNS
Combustion Utilities Corp.
Cruse-Kemper Co.
Improved Appliance Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Sturtevant Co., B. F.
Surface Combustion Co.

For Firing China, Glass & Pottery
Drakenfeld & Co., Inc., B. F.
General Gas Appliance Co.
Russell Engineering Co.
Surface Combustion Co.

LABORATORY (For Testing Fire Brick, Refractories, etc.)
Surface Combustion Co.

LABORATORY INVESTIGATIONS
U. G. I. Contracting Co.

LADLES, HOT METAL
Riter-Conley Co.
Safety Gas Main Stopper Co.

LAMPS

Gas Arc
General Gas Light Co.
Welsbach Co.

Street & Outdoor
Welsbach Co.

LIGHTERS

Cigar
Milwaukee Gas Specialty Co.

Cooker
Strause Gas Iron Co.

Range
Claus Automatic Gas Cock Co.
Michigan Stove Co.
Milwaukee Specialty Co.
Roper Corp., Geo. D.
Safety Gas Lighter Co.
Sherwood Co., J. M.
Strause Gas Iron Co.
Welsbach Co.

LIGHTING INCIDENTALS
General Gas Light Co.
Storrs Mica Co.
Welsbach Co.

LOGS, GAS
Century Stove & Mfg. Co.
Slattery & Bro. Inc., J. B.
Strait & Richards Inc.
Superior Mfg. Co.
Van Zandt Gas Appliance Co.

LUX MATERIAL
Alpha Lux Co., Inc.
Iron Hydroxide Co.

MACHINERY

Coal & Coke Bagging
Bartlett Hayward Co.
Beaumont Co., R. H.

Coal & Coke Handling (Conveying, Crushing, Screening)
American Gas Construction Co.
Bartlett Hayward Co.
Beaumont Co., R. H.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Phillips, Lang & Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Stephens-Adamson Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
West Gas Improvement Co. of America, Inc.

Special
National Machine Works
Riter-Conley Co.
Western Gas Construction Co.

MACHINES

Ironing
American Ironing Machine Co.
Johnson Gas Appliance Co.

Washing
American Ironing Machine Co.
Detroit Washing Machine Corp.
"1900" Washer Co.

MAINS, STREET
American Gas Construction Co.
S O S Welding Corp.

MANHOLE FRAMES & COVERS
Banner Iron Works

MANOMETERS
Bacharach Industrial Instrument Co.

MANTLES, GAS LIGHTING
General Gas Light Co.
Welsbach Co.

METAL RECEPTACLES
American Gas Furnace Co.
Combustion Utilities Corp.
Crane Co., Wm. M.
Gehnrich Indirect Heat Oven Co.
Hones Inc., Charles A.
National Machine Works
Surface Combustion Co.
United Lead Co.

METERS
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Builders Iron Foundry
Cleveland Gas Meter Co.
Connersville Blower Co.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Griffin & Co., John J.
Helme & McIlhenny
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
Metric Metal Works
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Rotary Meter Co.
Sprague Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

Air
American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Builders Iron Foundry
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc
Gas Machinery Co.
Metric Metal Works
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Sprague Meter Co.
Superior Meter Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

Boiler
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Pittsburgh Meter Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.

Burner Test
American Meter Co., Inc.
Lambert Meter Co.
Superior Meter Co.

Cast Iron Gas
American Meter Co.
Cleveland Gas Meter Co.
Equitable Meter Co.
Pittsburgh Meter Co.
Sprague Meter Co.

Coal
Bailey Meter Co.

Complaint
American Meter Co.
Superior Meter Co.

Consumers
American Meter Co., Inc.
Cleveland Gas Meter Co.
Equitable Meter Co.
Lambert Meter Co.
Pittsburgh Meter Co.
Sprague Meter Co.
Superior Meter Co.

Demand Limiting
American Meter Co. Inc.

Experimental
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Lambert Meter Co.
Precision Instrument Co.
Sprague Meter Co.
Superior Meter Co.

Filling Station
Pittsburgh Meter Co.

Flow
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Foxboro Co., Inc.
Lambert Meter Co.
Pittsburgh Meter Co.
Superior Meter Co.
Western Gas Construction Co.

Fluid
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Metric Metal Works
Republic Flow Meters Co.

Gas
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Builders Iron Foundry
Cleveland Gas Meter Co.
Connersville Blower Co.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Griffin & Co., John J.
Helme & McIlhenny
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
Metric Metal Works
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Rotary Meter Co.
Sprague Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

High Pressure Distribution
American Meter Co., Inc.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Republic Flow Meters Co.
Sprague Meter Co.

High Pressure Iron Case
American Meter Co., Inc.
Equitable Meter Co.
Pittsburgh Meter Co.
Sprague Meter Co.

Industrial Consumers
American Meter Co., Inc.
Bailey Meter Co.
Cutler-Hammer Mfg. Co.
Pittsburgh Meter Co.
Republic Flow Meters Co.
Sprague Meter Co.

Iron Case
American Meter Co., Inc.
Cleveland Gas Meter Co.
Equitable Meter Co.
Pittsburgh Meter Co.
Sprague Meter Co.

Laboratory
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Lambert Meter Co.
Precision Instrument Co.
Superior Meter Co.

Large Capacity
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Builders Iron Foundry
Cleveland Gas Meter Co.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Republic Flow Meters Co.
Sprague Meter Co.

Oil
American Gas Construction Co.
Builders Iron Foundry
Pittsburgh Meter Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

Oxygen
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Superior Meter Co.
Western Gas Construction Co.

Oxygen & Hydrogen
Bacharach Industrial Instrument Co.
Lambert Meter Co.
Sprague Meter Co.

Prepayment
American Meter Co., Inc.
Cleveland Gas Meter Co.
Sprague Meter Co.

Station
American Meter Co.
Builders Iron Foundry
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Connersville Blower Co.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Republic Flow Meters Co.
Superior Meter Co.
Western Gas Construction Co.

Steam
American Meter Co. Inc.

Builders Iron Foundry
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Gas Machinery Co.
Metric Metal Works
Republic Flow Meter Co.
Western Gas Construction Co.

Test
American Meter Co. Inc.
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Foxboro Co. Inc.
Lambert Meter Co.
Pittsburgh Meter Co.
Precision Instrument Co.
Sprague Meter Co.
Superior Meter Co.

Water
Bailey Meter Co.
Builders Iron Foundry
Pittsburgh Meter Co.
Republic Flow Meters Co.

Wet Test
American Meter Co. Inc.
Lambert Meter Co.
Pittsburgh Meter Co.
Precision Instrument Co.
Superior Meter Co.

MIXERS, GAS & AIR
American Gas Furnace Co.
Baltimore Gas Appliance & Mfg. Co.
Century Stove & Mfg. Co.
Combustion Utilities Corp.
Crane Co., Wm. M.
Detroit Brass & Malleable Works
Eriez Stove & Mfg. Co.
Fuller-Warren Co.
General Gas Appliance Co.
Grinnell Co., Inc.
Hale Mfg Co.
Hays Mfg. Co.
Johnson Gas Appliance Co.
Kemp Mfg. Co., C. M.
McClary Mfg. Co.
Maxon Furnace & Engineering Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Roper Corp., Geo D.
Schmidt, G. F.
Selas Co.
Strait & Richards, Inc.
Surface Combustion Co.

MOTORS
Sturtevant Co., B. F

MOUTHPIECES, RETORT
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Western Gas Construction Co.

OFFICE LABOR SAVING DEVICES
Addressograph Co.
Burroughs Adding Machine Co.
Defiance Check Writer Corp.
Elliott-Fisher Co.
Kalamazoo Loose-Leaf Binder Co.
Remington Typewriter Co.
Tallman, Robbins & Co.

Accounting Machines
Remington Typewriter Co.
Burroughs Adding Machine Co.
Defiance Check Writer Corp.

Accounting Supplies
Kalamazoo Loose-Leaf Binder Co.
Tallman, Robbins & Co.

Adding Machines
Burroughs Adding Machine Co.

Billing Machines
Burroughs Adding Machine Co.
Defiance Check Writer Corp.

Bookkeeping, Calculating, Ledger Posting Machines
Burroughs Adding Machine Co.

Bookkeeping Equipment
Kalamazoo Loose-Leaf Binder Co.

Card Record Systems & Supplies
Tallman, Robbins & Co.

Check Writers
Defiance Check Writer Corp.

Loose-Leaf Systems & Supplies
Kalamazoo Loose-Leaf Binder Co.
Tallman, Robbins & Co.

Typewriting Accounting Machines
Burroughs Adding Machine Co.
Remington Typewriter Co.

OIL, DIAPHRAGM
American Meter Co. Inc.
Griffin & Co., John J.
Lambert Meter Co.
Maryland Meter Works
Sprague Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

OVEN LININGS—RUST PROOF
Wilder Metal Co.

OVENS

Annealing
American Gas Furnace Co.
Blodgett Co., G. S.
Crandall-Pettee Co.
Gehnrich Indirect Heat Oven Co.
General Gas Appliance Co.
Grinnell Co. Inc.
Monarch Engineering & Mfg. Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Surface Combustion Co.
Young Brothers Co.

Baking & Cooking
Blodgett Co., G. S.
Clark & Co., Div., Geo. M.
Combustion Utilities Corp.
Crandall-Pettee Co.
Crane Co., Wm. M.
Elgin Stove & Oven Co.
Estate Stove Co.
Dangler Stove Co. Div.
Fuller-Warren Co.
General Gas Appliance Co.
Grinnell Co. Inc.
McClary Mfg. Co.
Meek Oven Mfg. Co.
National Stove Co. Div.
Ohio State Stove & Mfg. Co.
Quick Meal Stove Co. Div.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Sheet Metal Specialty Co.
Steiner & Co., Inc., E. E.
Surface Combustion Co.
Union Steel Products Co., Ltd.
Wheeling Corrugating Co.

By-Product
American Gas Construction Co.
Belgian American Coke Ovens Corp.
Gas Machinery Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Semet-Solvay Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.

Core & Mold
Blodgett Co., G. S.
Combustion Utilities Corp.
Gehnrich Indirect Heat Oven Co.
Monarch Engineering & Mfg. Co.
Surface Combustion Co.
Young Brothers Co.

Drying
American Gas Furnace Co.

Fireless Baking & Cooking
Chambers Mfg. Co.

Japanning & Enameling
American Gas Furnace Co.
Blodgett Co., G. S.
Crandall-Pettee Co.
Gehnrich Indirect Heat Oven Co.
General Gas Appliance Co.
Grinnell Co., Inc.
Monarch Engineering & Mfg. Co.
National Machine Works

Parker-Russell Mining & Mfg. Co.
Surface Combustion Co.
Young Brothers Co.

Laboratory
Young Brothers Co.

Warming
Blodgett Co., G. S.
Combustion Utilities Corp.
Crane Co., Wm. M.
Elgin Stove & Oven Co.
General Gas Appliance Co.
McClary Mfg. Co.
Meek Oven Mfg. Co.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Union Steel Products Co. Ltd.
Wheeling Corrugating Co.

OXIDE
Alpha Lux Co.
American Gas Construction Co.
Connelly Iron Sponge & Governor Co.
Gas Purifying Materials Co.
Iron Hydroxide Co.

PACKING

Pipe
Connelly Iron Sponge & Governor Co.
Grinnell Co. Inc.
Johns-Manville Inc.
United Lead Co.

Rod, Plunger, Piston, Flange
Connelly Iron Sponge & Governor Co.
Johns-Manville Inc.

Purifier Box
Gas Machinery Co.
Johns-Manville Inc.

PAINT

Holder
Stacey Mfg. Co.

Meter
Equitable Meter Co.
Lambert Meter Co.
Sprague Meter Co.
Tufts Meter Works, Nathaniel
Superior Meter Co.

Outside Steel Works
Johns-Manville Inc.

PAINTING (Holders & General)
U. G. I. Contracting Co.

PHOTOMETERS
American Gas Construction Co.
American Meter Co. Inc.
Connelly Iron Sponge & Governor Co.
Griffin & Co., John J.
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
Tufts Meters Works, Nathaniel
U. G. I. Contracting Co.

PILOTS
American Lava Corp.

PIPE

Cast Iron
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Isbell-Porter Co.
Russell Engineering Co.
Stacey Mfg. Co.
Steere Engineering Co.

Dipped
Riter-Conley Co.

Flanged
Davis & Farnum Mfg. Co.
National Machine Works
Stacey Mfg. Co.
Western Gas Construction Co.

Galvanized Blast
Young Brothers Co.

Lead
United Lead Co.

Lined
United Lead Co.

Riveted Steel
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Riter-Conley Co.
S O S Welding Corp
Stacey Bros. Gas Construction Co
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.

Steel
Bartlett Hayward Co.
Riter-Conley Co.
Stacey Mfg. Co.
Western Gas Construction Co.

Steel, Welded
Bartlett Hayward Co.
Cruse-Kemper Co.
Gas Engineering Co.
Grinnell Co. Inc.
National Machine Works
National Tube Co.
Riter-Conley Co.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
Western Gas Construction Co.

Steve
Sexton Stove & Mfg. Co., S. B.

Wrought Iron
Stacey Mfg. Co.

Wrought Iron Welded
Stacey Bros. Gas Construction Co.

PLANTS

Ammonia Recovery
Bartlett Hayward Co.
Gas Machinery Co.
Isbell-Porter Co.
Koppers Co.
Western Gas Construction Co.

By-Product Coke
Belgian American Coke Ovens Corp.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Semet-Solvay Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.

By-Product Gas
Bartlett Hayward Co.
Belgian American Coke Ovens Corp.
Gas Machinery Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.

Carburetted Water Gas
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
National Machine Works
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

Coal Gas
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Gautier & Co., J. H.
Improved Equipment Co.
Koppers Co.
Isbell-Porter Co.
Missouri Fire Brick Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Semet-Solvay Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
West Gas Improvement Co. of America, Inc.

Coal Gas By-Product
Bartlett Hayward Co.
Gas Machinery Co.
Improved Equipment Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
West Gas Improvement Co. of America, Inc.
Western Gas Construction Co.

Oil Gas
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Western Gas Construction Co.

Recovery & Manufacture of By-Products
Bartlett Hayward Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Semet-Solvay Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

Porcelain Enamel
Chicago Vitreous Enamel Product Co.
Porcelain Enamel & Mfg. Co.
Surface Combustion Co.

Water Gas
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
National Machine Works
Russell Engineering Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

PLUGS (Testing Mains & Running Service)
Safety Gas Main Stopper Co.

PORCELAIN ENAMEL PARTS
Baltimore Enamel & Novelty Co.
Chicago Vitreous Enamel Product Co.
Comstock Castle Stove Co.
Enamel Products Co.
Eriez Stove & Mfg. Co.
General Gas Light Co.
McClary Mfg. Co.
Phillips & Clark Stove Co.
Porcelain Enamel & Mfg. Co.
Roper Corp., Geo. D.
Union Steel Products Co. Ltd.

POSTS (Lamp)
Banner Iron Works
Davis & Farnum Mfg. Co.
General Gas Light Co.
Stacey Mfg. Co.
Welsbach Co.

PRINTING
Tallman, Robbins & Co.

PRODUCERS, GAS
American Gas Construction Co.
Bartlett Hayward Co.
Gas Engineering Co.
Gas Machinery Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

PROVERS, METER
American Meter Co. Inc.
Cleveland Gas Meter Co.
Equitable Meter Co.
Griffin & Co., John J.
Helme & McIlhenny
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
Metric Metal Works
Pittsburgh Meter Co.
Sprague Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

PUMPS
American Gas Construction Co.
Connersville Blower Co.
Davidson Co., M. T.
Gas Machinery Co.
Monarch Engineering & Mfg. Co.
Roper Corp., Geo. D.
Sefas Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel
Western Gas Construction Co.

Drip
American Meter Co. Inc.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Griffin & Co., John J.
Roper Corp., Geo. D.

PURCHASERS OF AMMONIACAL LIQUOR
Michigan Ammonia Works

PURIFIERS
American Gas Construction Co.
Bartlett Hayward Co.
Connelly Iron Sponge & Governor Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

PURIFYING MATERIALS
Alpha Lux Co., Inc.
American Gas Construction Co.
Connelly Iron Sponge & Governor Co.
Gas Purifying Materials Co.
Iron Hydroxide Co.
Lyon, Eph
Western Gas Construction Co.

PYROMETERS (Indicating & Recording)
American Gas Construction Co.
Bristol Co.
Connelly Iron Sponge & Governer Co
Foxboro Co. Inc.
Leeds & Northrup Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Surface Combustion Co.

RACKS (Oven & Broiler Wire)
Union Steel Products Co. Ltd.

RADIANTS & BACK WALLS
General Gas Light Co.
Schmidt, G. F.
Welsbach Co.

RADIATORS, GAS-FIRED
Hot Air
American Gas Appliance Co.
Clow & Sons, James B.
Crane Co., Wm. M.
Dangler Stove Co. Div.
Eriez Stove & Mfg. Co.
Grinnell Co. Inc.
Hugo Mfg. Co.
Kidde & Co.
Slattery & Bro. Inc., J. B.
Wolff Gas Radiator Co., A. H.

Steam
Clow & Sons, James B.
Slattery & Bro. Inc., J. B.
Wolff Gas Radiator Co., A. H.

RANGES
Combination Gas & Coal
A-B Stove Co.

Baltimore Gas Appliance & Mfg. Co.
Magee Furnace Co.
McClary Mfg. Co.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Somerville Stove Works
Walker & Pratt Mfg. Co.

Domestic Gas
A-B Stove Co.
American Range & Foundry Co.
American Stove Co.
Baltimore Gas Appliance & Mfg. Co.
Bartlett & Co. Inc.
Beckwith Co.
Brunner Stove Co.
Century Stove & Mfg. Co.
Chambers Mfg. Co.
Clark & Co., Geo. M.
Cleveland Co-Operative Stove Co.
Comstock-Castle Stove Co.
Crane Co., Wm. M.
Cribben & Sexton Co.
Dangler Stove Co. Div.
Detroit Stove Works
Eriez Stove & Mfg. Co.
Estate Stove Co.
Fuller-Warren Co.
General Gas Appliance Co.
Globe Stove & Range Co.
Home Stove & Foundry Co.
Howard Stove Co.
Magee Furnace Co.
McClary Mfg. Co.
Malleable Iron Range Co.
Michigan Stove Co.
Moffats, Limited
National Stove Co. Div.
New Process Stove Co. Div.
Ohio State Stove & Mfg. Co.
Peerless Mfg. Co.
Peninsular Stove Co., The
Phillips & Clark Stove Co.
Quick Meal Stove Co. Div.
Rathbone, Sard & Co.
Reliable Stove Co. Div.
Roberts & Mander Stove Co.
Roper Corp., Geo. D.
Scott Gas Appliance Co. Inc.
Security Stove & Mfg. Co.
Sexton Stove & Mfg. Co., S. B
Sherwood Co., J. M.
Slattery & Bro. Inc., J. B.
Somerville Stove Works
Tappan Stove Co.
Tinnerman Stove & Range Co.
Trenkamp Stove & Mfg. Co.
Union Stove Works
Vesta Gas Range & Mfg. Co.
Walker & Pratt Mfg. Co.
Wehrle Co.
Weir Stove Co.
Wheeling Corrugating Co.
Wincroft Stove Works

Domestic Fireless
Chambers Mfg. Co.

Hotel
American Stove Co.
Baltimore Gas Appliance & Mfg. Co.
Clark & Co. Div., Geo. M.
Comstock-Castle Stove Co.
Crane Co., Wm. M.
Dangler Stove Co., Div.
Detroit Stove Works
Duparquet, Huot & Moneuse Co.
Estate Stove Co.
Fuller-Warren Co.
General Gas Appliance Co.
McClary Mfg. Co.
Michigan Stove Co.
Quick Meal Stove Co. Div.
Reliable Stove Co. Div.
Roberts & Mander Stove Co.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.

RECEIVERS, AIR EXPANSION TANK
Riter-Conley Co.
Roper Corp., Geo. D.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.

RECORDERS

CO
Foxboro Co. Inc.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.

Draft
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Foxboro Co. Inc.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.

Gravity
Bailey Meter Co.
Precision Instrument Co.

Pressure
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Equitable Meter Co.
Foxboro Co. Inc.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.

SO_2
Precision Instrument Co.

Vacuum
Bacharach Industrial Instrument Co
Bristol Co.

REFRACTORY MATERIALS
Gas Machinery Co.
Gautier & Co., J. H.
Harbison-Walker Refractories Co.
Improved Equipment Co.
Johns-Manville Inc.
Missouri Fire Brick Co.
Monarch Engineering & Mfg. Co.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Riter-Conley Co.
Russell Engineering Co.
Schmidt, G. F.
Stacey Bros. Gas Construction Co.
United States Refractories Corp.

REGULATORS
American Gas Construction Co.
American Gas Furnace Co.
Bryant Heater & Mfg. Co.
Chaplin-Fulton Mfg. Co.
Claus Automatic Gas Cock Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Equitable Meter Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Mueller Mfg. Co., H.
National Machine Works
Reynolds Gas Regulator Co.
Selas Co.
Sprague Meter Co.
Stacey Bros. Gas Construction Co.
Steere Engineering Co.
Western Gas Construction Co.

Gas, Automatic Cut-Off
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Equitable Meter Co.
Ofeldt Gas Fired Boiler Co.
Robertshaw Thermostat Co.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.

High Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.
Western Gas Construction Co.

House Service
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.

Reynolds Gas Regulator Co.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.
National Machine Works

Low & High Pressure
American Gas Construction Co.
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co. Inc.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.

Pressure
Foxboro Co. Inc.
Reynolds Gas Regulator Co.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.

Steam
Robertshaw Thermostat Co.

Temperature
American Gas Furnace Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co. Inc.
Honeywell Heating Specialties Co.
New Process Stove Co.
Robertshaw Thermostat Co.
Schaeffer & Budenberg Mfg. Co.
Western Gas Construction Co.
Wilson Co., H. A.

Vacuum
Chaplin-Fulton Mfg. Co.
Connersville Blower Co.

Water
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co
Geyser Sales Co.
Ofeldt Gas Fired Boiler Co.
Robertshaw Thermostat Co.
Schaeffer & Budenberg Mfg. Co.

REPAIRS

Gas Appliance
Detroit Stove Works
Western Gas Construction Co.

Meter
American Meter Co., Inc.
Equitable Meter Co.
Griffin & Co., John J.
Helme & McIlhenny
Lambert Meter Co.
Maryland Meter Works
Metric Metal Works
Pittsburgh Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

RESUCITATING & FIRST AID DEVICES
Connelly Iron Sponge & Governor Co.
Lungmotor Corp.
U. G. I. Contracting Co.

RETORTS
Bartlett Hayward Co.
Gas Machinery Co. Inc.
Gautier & Co., J. H.
Harbison-Walker Refractories Co.
Improved Equipment Co.
Isbell-Porter Co.
Missouri Fire Brick Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
U. G. I. Contracting Co.
West Gas Improvement Co. of America, Inc.

RIVETERS, PNEUMATIC
Bartlett Hayward Co.

ROASTERS (Coffee, Peanut, Spice)
Combustion Utilities Corp.

ROOFING
Johns-Manville Inc.

RUST PREVENTIVES
Superior Laboratories
Surface Combustion Co.
Welsbach Co.

SAFETY DEVICES (Gas Masks, Oxygen Breathing Apparatus, Etc.)
Connelly Iron Sponge & Governor Co.
Lambert Meter Co.
Lungmotor Corp.
Mine Safety Appliances Co.
Protecto Safety Appliance Co.

SCRUBBERS
American Gas Construction Co
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Foundation Oven Corp.
Gas Engineering Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
National Machine Works
Parker-Russell Mining & Mfg. Co
Riter-Conley Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

SELLING AGENTS
American Gas Construction Co.
Geyser Sales Co.
Kidde & Co.
Sherwood Co., J. M.

SETTINGS, BOILER & BENCH
Gas Machinery Co.
Gautier & Co., J. H.
Improved Equipment Co.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Riter-Conley Co.
Russell Engineering Co.

SHEET METAL
Sheet Metal Specialty Co.
Union Steel Products Co. Ltd.
Wheeling Corrugating Co.
Wilder Metal Co.

SHELVES (Meter)
Crane Co., Wm. M.
Lattimer-Stevens Co.
Union Steel Products Co., Ltd.

SHIELDS (Radiator)
Hugo Mfg. Co.

SPECIALS

Cast Iron
Banner Iron Works
Bartlett Hayward Co.
Connelly Iron Sponge & Governor Co.
Davis & Farnum Mfg. Co.
Ericz Stove & Mfg. Co.
Gas Machinery Co.
Grinnell Co. Inc.
Improved Equipment Co.
Isbell-Porter Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Roper Corp., Geo. D.
Russell Engineering Co.
Sexton Stove & Mfg. Co., S. B.
Stacey Bros. Gas Construction Co
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

Refractory Material
American Lava Corp.
Gautier & Co., J. H.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Russell Engineering Co.

SPECIALTIES FOR GAS RANGES
Schmidt, G. F.

STACKS (Steel)
Cruse-Kemper Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Riter-Conley Co.
S O S Welding Corp.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.

STAND PIPES
Bartlett Hayward Co.
Cruse-Kemper Co
Davis & Farnum Mfg. Co.

Gas Machinery Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Mfg. Co.
Western Gas Construction Co.

STEEL WORK, STRUCTURAL
American Gas Construction Co.
Banner Iron Works
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Improved Equipment Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.

STILLS
Bartlett Hayward Co.
Combustion Utilities Corp.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Isbell-Porter Co.
S O S Welding Corp.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.

Ammonia
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Isbell-Porter Co.
Koppers Co.
National Machine Works
Stacey Mfg. Co.
Western Gas Construction Co.

Benzol, Toluol
Bartlett Hayward Co.
Cruse-Kemper Co.
Gas Machinery Co.
Koppers Co.
Semet-Solvay Co.
Stacey Mfg. Co.
Western Gas Construction Co.

Water
Improved Appliance Co.
Young Brothers Co.

STOPPERS, GAS MAIN
Connelly Iron Sponge & Governor Co.
Safety Gas Main Stopper Co.

STOVES

Confectioners
A-B Stove Co.
American Stove Co.
Clark & Co., Geo. D.
Combustion Utilities Corp.
Crane Co., Wm. M.
Crandall-Pettee Co.
Baltimore Gas Appliance & Mfg. Co.
Dangler Stove Co. Div.
Elgin Stove & Oven Co.
Estate Stove Co.
Fuller-Warren Co.
General Gas Appliance Co.
Johnson Gas Appliance Co.
Quick Meal Stove Co. Div.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Somerville Stove Works

Laundry
A-B Stove Co.
American Stove Co.
Baltimore Gas Appliance & Mfg. Co.
Clark & Co. Div., Geo. M.
Cleveland Co-Operative Stove Co.
Combustion Utilities Corp.
Crandall-Pettee Co.
Crane Co., Wm. M.
Dangler Stove Co. Div.
Elgin Stove & Oven Co.
Eriez Stove & Mfg. Co.
Estate Stove Co.
Fuller-Warren Co.
General Gas Appliance Co.
Johnson Gas Appliance Co.
McClary Mfg. Co.
Michigan Stove Co.
New Process Stove Co. Div.
Quick Meal Stove Co. Div.
Rathbone, Sard & Co.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Slattery & Bro., Inc., J. B.
Wehrle Co.

SYSTEMS

Condensing
Bartlett Hayward Co.
Isbell-Porter Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

High Pressure
American Gas Construction Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Grinnell Co. Inc.
Kemp Mfg. Co., C. M.
Mueller Mfg. Co., H.
Selas Co.
Surface Combustion Co.

Low Pressure
Selas Co.

TABLES (Brazing and Soldering)
American Gas Furnace Co.

TACHOMETERS
Bailey Meter Co.
Bristol Co.
Foxboro Co. Inc.
Schaeffer & Budenberg Mfg. Co.

TANKS
American Gas Construction Co.
Bartlett Hayward Co.
Combustion Utilities Corp.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Gehnrich Indirect Heat Oven Co.
Kompak Co.
Metcalfe-Shaw Corp.
National Tube Co.
Riter-Conley Co.
Roper Corp., Geo. D.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
Western Gas Construction Co.
Young Brothers Co.

TAR DEHYDRATORS
Metcalfe-Shaw Corp.
Sharples Specialty Co.

THERMOMETERS (Indicating & Recording, all kinds)
American Meter Co. Inc.
Bristol Co.
Combustion Utilities Corp.
Connelly Iron Sponge & Governor Co.
Elgin Stove & Oven Co.
Foxboro Co. Inc.
Gas Engineering Co.
Gas Machinery Co.
Grinnell Co. Inc.
Lambert Meter Co.
Metric Metal Works
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel
Wehrle Co.
Western Gas Construction Co.

THERMOSTATS (All kinds)
American Radiator Co.
Bryant Heater & Mfg. Co.
Bristol Co.
Claus Automatic Gas Cock Co.
Gas Machinery Co.
Geyser Sales Co.

(Continued on page 382)

COMMERCIAL SECTION

WILLIAM GOULD, Chairman — J. E. DAVIES, Vice-Chairman

LOUIS STOTZ, Secretary

MANAGING COMMITTEE—1923

At Large

BARNES, CYRUS, Boston, Mass.
BARTLETT, C. E., Philadelphia, Pa.
DUTTON, L. R., Jenkintown, Pa.
EVES, PHILMER, New Haven, Conn.
HANLAN, J. P., Newark, N. J.
HUMPHREY, H. E., New York, N. Y.
JONES, J. B., Bridgeton, N. J.
KAHN, B. B., Hamilton, Ohio.
KNAPP, F. H., Pittsburgh, Pa.
MACSWEENEY, J. P., Rochester, N. Y.
MILENER, E. D., Baltimore, Md.
MURRAY, J. J., Biddeford, Me.
MYERS, J. B., Philadelphia, Pa.
NEWMAN, H. H., Trenton, N. J.
POLLITT, L. I., Baltimore, Md.
POST, A. P., Philadelphia, Pa.
QUINN, J. J., Quincy, Mass.
RASCH, W. T., New York, N. Y.
SMITH, D. R., Baltimore, Md.
STANNARD, C. N., Denver, Col.
STEPHANY, E. J., Pittsburgh, Pa.
SPETSER, J. R., Gloucester, N. J.
TAYLOR, J. D., Baltimore, Md.

Representing Affiliated Societies

BURKE, E. J., Indianapolis, Ind. (Indiana)
COEL, W. F., Mexico, Mo. (Missouri)
CRAFTS, H. C., Pittsfield, Mass. (N. E. Gas Eng.)
CRANKSHAW, J. W., Allentown, Pa. (Pennsylvania)
CRAWFORD, H. M., San Francisco, Cal. (Pacific Coast)
DEMING, H. A., Mt. Vernon, N. Y. (Empire State G. & E.)
FLAUTT, J. J., New Orleans, La. (South Central)
GOSS, A. J., Ottumwa, Ia. (Iowa)
JOHNSON, W. B., Toronto, Can. (Canadian)
JONES, JACOB P., Bridgeton, N. J. (New Jersey)
LEARNED, J. G., Chicago, Ill. (Illinois)
MCDONNOLD, H. E., Greenville, S. C. (Southern)
QUINN, JOHN J., Quincy, Mass. (Gas Sales of N. E.)
SCHROEDER, A. G., Grand Rapids, Mich. (Michigan)
ST. JOHN, JOHN, Madison, Wis. (Wisconsin)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Cooperation with Architects and Builders— R. S. DOULL, New York, N. Y.

Cooperation with the Plumber and Heating Dealer— F. H. KNAPP, Pittsburgh, Pa.

Home Economics Service Bureau—PHILMER EVES, New Haven, Conn.

Industrial Gas—E. J. STEPHANY, Pittsburgh, Pa.

Retail Pricing—A. P. POST, Philadelphia, Pa.

Sales Stimulation—J. E. DAVIES, Chicago, Ill.

Effective Salesmanship Lies in Service

THE opinion voiced by Mr. Barnum in his Presidential Address at the recent Atlantic City Convention, that our industry since the war has been principally interested in increasing sales, is sufficiently indicative of the attitude of gas company executives to give the Sales Department food for thought and an incentive for greater effort. He further said:

"There are many lines of thought as to the value of advertising, salesmanship, soliciting, campaigning, etc. To my mind the most effective salesmanship is in service. Of course the word 'service' covers a multitude of activities. It begins when the customer first comes and applies for a meter and it never ends; but in all our relations with our customers there is one factor that has been neglected by a great many gas companies during the past few years. When utility corporations began about twenty years ago to enlarge and consolidate, making large companies by combining several small ones, they obtained the advantage of combined operations in manufacture, distribution and finances but they neglected one of the most important elements in all commercial business, that is the personal element between the proprietor and customer. It behooves the utili-

ty today to reintroduce into its relations the personal element by education and training of its employees, the factor which has built up so many prosperous and successful concerns in this country and without which no undertaking will ever be successful; and the foundation of this personal relation between proprietor and customer is courtesy."

The gas business is no different from any other in the matter of establishing a selling contact with the customer. No successful merchant would ever think of neglecting a customer whose name is once on his books for it is the repeat business of his old customers added to his new business which enables him to be firmly established in a given territory.

Take the tobacco industry as an example and for a specific case the United Cigar Stores with their wonderful chain store plan. What are they interested in mostly, the transient trade which comes to their stores or the building up of a profitable every day patronage of regular customers—in other words repeat business? And likewise the department stores, they too, are keenly after regular cash or charge account customers rather than the insecure transient trade which must be given unusual inducement to deal at a particular store. And what do these master merchants depend on mostly for the upbuilding of their business? It is Service and everything that that word stands for—courteous treatment, high class merchandise at a fair price and prompt deliveries.

Now, wherein is the gas business any different from these other enterprises when it comes to merchandising its products? And further, haven't we in the gas business a much more wonderful opportunity than they?—As Mr. Barnum said before the Commercial Section, what would the department stores do if they had the same number of charge accounts as the gas company has and with the gas company's facilities for collection? We have today the largest retail credit business in the world with a means of collecting, of keeping track of credits and the possibility of increasing the sales of our present customers that no other commercial enterprise has.

These facts lead to a very definite conclusion—the sale of gas represents our repeat business and that business will only reach its maximum when the customer, through every avenue of contact which the gas company has, and there are many, is given a service which he can get nowhere else and which he will in turn appreciate and of which he will take the fullest possible advantage.

(Continued from page 353)

Weir Stove Co. ..... Taunton, Mass.
Welsbach Co. ..... Gloucester, N. J.
Western Gas Construction Co., The ..... Fort Wayne, Ind.
West Gas Improvement Co. of America ..... 150 Nassau St., New York, N. Y.
Wheeling Corrugating Co. ..... Wheeling, W. Va.
Wilbraham-Green Blower Co. ..... Pottstown, Pa.
Wilder Metal Company ..... Niles, O.
Wilson Co., H. A. ..... 97 Chestnut St., Newark, N. J.
Wincroft Stove Works ..... Middletown, Pa.
Wolff Gas Radiator Co., The A. H. ..... 4 Great Jones St., New York, N. Y.

Young Brothers Co. ..... 6500 Mack Ave., Detroit, Mich.

Conditioning of Silk by Indirect Gas-Heated Air

Battery of four single units for conditioning silk by indirect gas-fired Air Heaters.

Gas consumption per unit = 35 to 40 cu. ft. (600 B.t.u.) gas per hour average.

Air supplied = 70 cu. ft. per minute per unit at 2 oz.

For more detailed information, apply to A. G. A. Headquarters.

Cereal Drying Indirectly with Gas-Heated Air

Chamber for use with Air Heater.

Air Heater consumes 200 cubic feet of 600 B.t.u. gas per hour at start. Average consumption 70 cubic feet per hour.

Production of cereal dried per three hours = 150 lbs.

For more detailed information, apply to A. G. A. Headquarters.

Conditioning Silk and Textiles by Indirect Gas-Heated Air

Four dryers operated by one gas fired Air Heater.

Gas consumption of Air Heater = 90 cu. ft. (600 B.t.u.) gas per hour average or 200 cu. ft. per hour maximum.

Blower capacity = 300 cu. ft. of air per minute (total for 4). Pressure = 2 oz.

For more detailed information, apply to A. G. A. Headquarters.

Gas Fuel for Stereotype Furnaces

Maximum Gas Consumption—3,000 cu. ft. per hr.

Average Gas Consumption—1,400 cu. ft. per hr.

Temperature—650° F.

Maximum Production—6-82 lb. plates per minute.

Gas Consumption per plate—12 cu. ft.

For more detailed information, apply to A. G. A. Headquarters.

TECHNICAL SECTION

F. C. WEBER, Chairman — H. C. WEHNERT, Vice-Chairman

H. W. HARTMAN, Secretary

MANAGING COMMITTEE—1923

At Large

BATES, H. E., Chicago, Ill.
BECKJORD, W. C., New York, N. Y.
BERRY, WALTER M., Washington, D. C.
BURDICK, R. H., New York, N. Y.
COOK, JR., H. R., Baltimore, Md.
EATON, H. M., Detroit, Mich.
FIELDNER, A. C., Pittsburgh, Pa.
FREEMAN, F. C., Providence, R. I.
HAFFENKAMP, J. P., Rochester, N. Y.
HOWARD, A. C., New York, N. Y.
SERRILL, W. J., Philadelphia, Pa.
SPEAR, F. W., Pittsburgh, Pa.
VITTINGHOFF, H., Boston, Mass.
WILLIEN, L. J., Boston, Mass.

Representing Affiliated Societies

BERTKE, W. J., Sioux City, Ia. (Iowa)
BROWN, J. A., Jackson, Mich. (Michigan)
CORNISH, R. C., Philadelphia, Pa. (Pennsylvania)
DUNN, F. S., Albany, N. Y. (Empire State G. & E.)
ELBERT, V. L., St. Joseph, Mo. (Missouri)
FERRIER, JAS., Atlanta, Ga. (Southern)
HALL, E. L., Portland, Ore. (Pacific Coast)
HOT, C. W., Glassboro, N. J. (New Jersey)
HUMPHREYS, J. J., Montreal, Can. (Canadian)
JOHNSON, G. M., South Bend, Ind. (Indiana)
LYONS, B. F., Beloit, Wis. (Wisconsin)
OTTEN, JR., C. H., Plymouth, Mass. (Gas Sales of N. E.)
PRICHARD, C. R., Lowell, Mass.
RICHARDSON, R. B., Peoria, Ill. (Illinois)
SEDBERRY, W. H., Marshall, Texas (South Central)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Carbonization and Complete Gasification of Coal—R. G. PORTER, Chester, Pa.
Cast Iron Pipe Standards—WALTON FORSTALL, Philadelphia, Pa.
Chemical—A. C. FIELDNER, Pittsburgh, Pa.
Coke—V. A. MILLER, Rochester, N. Y.
Deposits in Gas Pipes and Meters—DR. R. L. BROWN, Pittsburgh, Pa.
Disposal of Waste from Gas Plants—L. J. WILLIEN, Boston, Mass.
Distribution Design—R. G. GRISWOLD, New York, N. Y.
Fundamentals of Condensing and Scrubbing—W. H. EARLE, Rochester, N. Y.
Holder—H. E. BATES, Chicago, Ill.
Measurements of Large Volumes of Gas—M. E. BENESH, Chicago, Ill.
Nominating—C. N. CHUBB, Davenport, Ia.
Program of Research—DR. J. F. WING, Boston, Mass.
Purification—DR. A. R. POWELL, Pittsburgh, Pa.
Refractory Materials—W. H. FULWEILER, Philadelphia, Pa.
Specifications for Gas Coal—H. J. ROSE, Pittsburgh, Pa.
Standardization of Capacities of Consumers' Meters—WALTON FORSTALL, Philadelphia, Pa.

Thermal Operation of Modern Regenerator Coke Ovens

D. W. WILSON, Director, and H. O. FORREST and C. H. HERTY, Jr., Asst. Directors, Buffalo Station, School of Chemical Engineering Practice, Massachusetts Institute of Technology, Lackawanna, N. Y.

SEVERAL careful thermal efficiency tests were made on coke ovens by students in the School of Chemical Engineering Practice of the Massachusetts Institute of Technology, and the figures thus obtained form the basis of this paper. The equipment studied was one sixty-oven battery of regenerator ovens fired by a part of the gas produced from the coal. The coal used consisted of coal of 33 per cent volatile matter and coal of 18 per cent volatile matter so mixed as to produce about 27 to 28 per cent volatile in the mixture. The coke produced was for use in blast furnaces. The coke plant was completely equipped with apparatus for recovery of the usual by-products. The excess coke-oven gas was used for raising steam or in steel-reheating furnaces. Only that portion of the paper on this test which shows the actual data obtained is given herewith. The paper, in its entirety, however, was published in Industrial and Engineering Chemistry, Vol. 15, No. 3, page 251. March, 1923.

Data Obtained

In Table I are included experimental

*Paper presented before the Section of Gas and Fuel Chemistry at the 64th Meeting of the American Chemical Society, Pittsburgh, Pa., September 4 to 8, 1922.

data obtained during the test and on the basis of which are calculated the heat balances given later.

Discussion of Experimental Data

In Table I the observed higher heating value of the coal has been corrected by 110 B.t.u. per lb. for its sulfur and nitrogen content. This correction, largely due to sulfur, does not include all the sulfur and nitrogen of the coal but only that part which gives up heat in the bomb calorimeter, but is not present in the coke. In the results in Table II the corrected higher heating value of 14,470 B.t.u. per lb. was used. The weight of drags per oven—that is, coal removed from the oven during leveling—was practically negligible.

In quenching the hot coke, the water used carries with it some fine coke which settles out in a sump and is removed at intervals and burned under the boilers. It is this item which has been estimated at 11 lbs. per ton of dry coal, or 0.5 per cent.

It is largely through chance that the close agreement shown in Table I was obtained between the calculated fuel-gas heating value and the calorimeter value, since the experimental error was greater than the difference between 549 and 551 B.t.u. per cu. ft. It is thought that the fuel-gas consumption of 4070 cu. ft. per ton of coal coked, or of 36.5 per cent of the total gas produced, represents excellent coke-plant practice.

The difference between the value of 588 B.t.u. per cu. ft. for the foul gas and that of 549 for the fuel gas is accounted for by the light oil and the ammonia.

The tar yield of 9.5 gal. per ton seems low, probably caused by lack of precision in tank measurements due to the short length of the test with respect to volume of tar produced. The measurement of

TABLE I—GENERAL DATA

(Dates of Test, December 8 to 10, 1921. Coking time, 18 hrs.)

Coal Charged:	
Average weight per oven as charged	30,130 lbs.
Weight of drags per oven	25 lbs.
Tons per hour (dry basis)	49.2
Free moisture (wet basis)	4.6 per cent
Volatile (dry basis)	26.0 per cent
Ash (dry basis)	6.09 per cent
Temperature of coal	39.0°F.
Higher heating value (uncorrected dry basis)	14,580 B.t.u./lb.
Higher heating value (corrected for sulfur and nitrogen)	14,470 B.t.u./lb.
Specific heat	0.314
Coke Produced:	
Average weight per oven, furnace coke as produced	20,070 lbs.
Average weight per oven, total coke as produced	21,625 lbs.
Average moisture (wet basis)	3.12 per cent
Volatile (dry basis)	1.14 per cent
Ash (dry basis)	9.12 per cent
Average yield furnace coke (dry basis coal and coke)	67.5 per cent
Average yield total coke (dry basis coal and coke)	72.8 per cent
Coke breeze in pond (lbs. per ton dry coal estimated)	11 lbs.
Per cent coke breeze in pond	0.5 per cent
Temperature as pushed	2140°F.
Heating value	13,020 B.t.u./lb.
Specific heat	0.42
Fuel Gas Used:	
Volume at 60°F., 30 in. Hg (satd.) per net ton (dry coal)	4,070 cu. ft.
Gross heating value (calorimeter)	549 B.t.u./cu. ft.
Gross heating value (calculated)	551 B.t.u./cu. ft.
Per cent total gas used as fuel gas	36.5 per cent
B.t.u. per lb. dry coal coked	1120
Fuel Gas Analyses:	
CO_2	1.4 per cent
Illuminants	2.9 per cent
Oxygen	0.5 per cent
CO	5.1 per cent
Hydrogen	57.4 per cent
Methane	28.5 per cent
Nitrogen	4.2 per cent
Foul Gas Produced:	
Volume at 60°F., 30 in. Hg (satd.) per net ton (dry coal)	11,150 cu. ft.
Average temperature	1430°F.
Gross heating value including light oil	588 B.t.u./cu. ft.
Tar Produced:	
Amount per ton	9.5 gal.
Specific gravity	1.2
Specific heat	0.4
Heat of vaporization (estimated)	162 B.t.u./lb.
Gross heating value	15,865 B.t.u./lb.
Condensate Produced:	
Total net amount condensed (not including tar)	18.45 gal./ton
From free moisture in coal	11.50 gal./ton
From combined moisture in coal	6.95 gal./ton
Oxygen per centin coal appearing in condensate as combined moisture	2.6
Light Oil Produced:	3.3 gal./ton
Air Used:	
Volume per ton of dry coal, updraft, at 32°F. (from orifice reading)	40,500 cu. ft.
Volume per ton of dry coal, updraft, at 32°F. (calculated at east bulkhead)	39,600 cu. ft.
Stack draft, updraft	42 mm. kerosen
Volume per ton of dry coal at 32°F. (from orifice reading), downdraft	38,000 cu. ft.
Volume per ton of dry coal, at 32°F. (calculated at west bulkhead), downdraft	37,200 cu. ft.
Stack draft, downdraft	45 mm. kerosene
Waste Gas Produced:	
Average volume wet gas per ton dry coal at 32°F.	44,500 cu. ft.
Temperature, east bulkhead	456°F.
Temperature, west bulkhead	622°F.

Analyses of Gas, Per cent	**CO_2**	**O**	**N_2**	**Excess Air**
East bulkhead	4.4	11.9	83.7	118
West bulkhead	4.7	11.4	83.9	107

condensate was much more accurate than that of the tar. The figure of 18.45 gal. of condensate does not include all the water produced from the coal, since after cooling the gas is still saturated at its temperature with water vapor originally derived from the coal. By deducting from the total condensate produced that made from the known free moisture, it was found that 2.6 per cent combined oxygen appeared as condensed water.

Reference to the data on air shows that on the one draft actual measurement gave 40,500 cu. ft. at 32 deg. F., while calculations from gas analysis give 39,600 cu. ft. of air under the same conditions. On the other draft the measured volume was 38,000 cu. ft., while the calculated volume was 37,200 cu. ft. When gas-sampling and gas-analysis errors are considered, these checks of about 3 per cent would indicate both results to be trustworthy.

The excess air as calculated from the waste-gas analysis showing 118 per cent on the one draft and 107 per cent on the other, indicates more air than is needed for complete combustion and a consequent higher fuel consumption than necessary.

Discussion of Results

In Table II are shown the test results as a total heat balance. Heat losses by radiation and convection in this test were determined by dividing the entire exposed surface into several areas, each of which was uniform with respect to surface temperature and external conditions. Measurements were then made of the skin temperature, the areas exposed, the wind velocity, and atmospheric temperatures. The results calculated from these measurements, totaled and expressed per ton of coal, are included in Table II.

TABLE II—TOTAL HEAT BALANCE
(Basis, 1 net ton of dry coal—32°F.)

Input:	B. t.u.	Per cent Input
Latent heat in coal	28,940,000	92.8200
Sensible heat in coal	4,000	0.013
Latent heat in fuel gas	2,230,000	7.1500
Sensible heat in fuel gas	4,000	0.0130
Sensible heat in air	700	0.0002
Total (approx.)	31,180,000	100.0000
Output:		
Latent heat in coke	19,170,000	61.500
Sensible heat in coke	1,290,000	4.140
Latent heat in foul gas	6,562,000	21.040
Sensible heat in foul gas	386,000	1.238
Water in foul gas	302,000	0.970
Latent heat in tar	1,507,000	4.840
Latent heat of evaporation and sensible heat in tar	69,000	0.221
Sensible heat in dry waste gas	402,000	1.290
Water in waste gas	320,000	1.026
Radiation and convection losses	373,000	1.190
Total	30,381,000	97.455
Total heat input	31,180,000	
Total heat output	30,381,000	
Unaccounted for	799,000 = 2.545 per cent of input	
Efficiency of ovens	87.38 per cent	

From this table it is seen that the large source of heat is the latent heat in the coal. In the output this mainly shows up as the heat of combustion of the coke. It is of interest to note that, owing to the high percentage of methane and hydrogen in the fuel gas, the loss up the stack due to water vapor is 1.026 per cent as compared with 1.29 per cent, the loss due to all other chimney gases.

TABLE III—SENSIBLE HEAT BALANCE
(Basis, 1 net ton of dry coal—32°F.)

Input:	B. t. u.	Per cent Input
Sensible heat in coal	4,000	0.18
Sensible heat in fuel gas	4,000	0.18
Sensible heat in air	700	0.03
Latent heat in fuel gas	2,230,000	99.60
Total	2,238,700	100.00
Output:		
Sensible heat in coke	1,290,000	57.70
Sensible heat in foul gas	386,000	17.24
Water in foul gas	302,000	13.50
Latent heat of evaporation and sensible heat in tar	69,000	3.08
Sensible heat in dry waste gas	402,000	17.97
Water in waste gas	320,000	14.30
Radiation and convection losses	373,000	16.66
Total	3,142,000	140.45
Sensible heat output	3,142,000	
(Sensible heat input approx.)	2,238,000	
Difference	904,000 B.t.u. per ton	
Exothermicity of reaction	452 B.t.u. per lb. = 40.45 per cent of input	

As ordinarily defined, efficiency represents the useful heat or work produced divided by the total heat or work input. On this basis the efficiency of these ovens is 87.38 per cent or the sum of the latent

heat of the coke, that of the tar, and that of the foul gas. This figure is extremely high when compared with boilers or almost any other type of furnace. On the other hand, it must be remembered that here the bulk of the heat is not transferred from a gas to either solid or liquid but it is charged into the oven as coal and appears chiefly as coke. Of the various losses that due to the hot coke is the greatest, and its value should be sufficient to warrant consideration of means for conserving at least some of it. In respect to the other losses, important minor economies might be made, yet probably with the present system of coking no major saving could be effected.

Table III, so-called "Sensible Heat Balance," is simply a rearrangement of Table II, omitting from the latter latent heats of coal, of coke, of foul gas, and of tar. In this balance it is interesting to note that the output exceeds the input by about 40 per cent. This should mean, then, that the net effect of the coking operation is exothermic to this extent. This exothermicity presumably represents the net heat effect of fusing the coal, the evaporation of various hydrocarbons, some decomposition, and heats of formation of carbon dioxide, carbon monoxide, methane, and other compounds. It is possible to calculate roughly the heat effect of coking from the composition of the products formed. This, however, is qualitative only, since the mechanism of the decomposition is not definitely known. Furthermore, undoubtedly, the heat evolved would vary with the temperature since the character of the tar and other products of coking is dependent upon the temperature of carbonization. This test would give a figure of about 450 B.t.u. per lb. of dry coal coked as the exothermicity of the coking process. Bearing in mind that the oxygen content of this coal mixture is about 5 per cent, this figure for the heat liberated qualitatively agrees well with the results of work done independently by Mahler and Euchene by quite different methods. It should be noted, however, that this value of 450 B.t.u. per lb. is not exact since it is obtained as a difference between relatively large numbers, and consequently a small percentage variation in either of these values will produce a large percentage variation in the difference between them. However, the value is qualitatively correct, and is included here in view of the need for more knowledge of the heat requirements for coking different coals, particularly the heat required as the oxygen content varies. If values with varying oxygen content were known, such information should prove of great help in determining the coking qualities and the heat requirements of new coal mixtures.

Acknowledgement

It is desired to acknowledge here the great interest and the untiring enthusiasm of the students in the School of Chemical Engineering Practice who did the actual experimental work and to whose efforts is due the success of the work.

Tentative Specifications for Gas and Coke Coals*

GAS AND coking coals must yield both merchantable gas and coke when distilled in a retort or oven by commercial methods. The type of coals may vary within rather wide limits according to the treatment in the retort and the market for the products. This specification aims, therefore, merely to give the limits within which gas and coking coals will usually fall, and to indicate the circumstances under which further restrictive conditions should be imposed.

General

Sampling and Analysis. The methods of the American Society for Testing Materials shall be used.

Chemical Composition. The "carbon ratio," that is, the ratio of fixed carbon to volatile matter, while not entirely reliable, is the best simple index to the behavior of the coal when carbonized. The carbon ratio in the case of gas coals will vary from 1.4 to 2.0 and for coking coals from 1.4 to 5.0. The latter class includes a wide range of coals varying from high volatile gas coal to low volatile or "smokeless" coal.

Mine Moisture. The percentage of moisture in the coal as mined shall be subject to agreement.

In the absence of definite agreement in coal contracts, mine moisture shall not exceed 4.0 per cent, to be determined by the general average composition of coal from the mine in question. Analysis of each shipment for mine moisture shall not be required.

Fusing Point of Ash. The fusing point of ash is not usually important for metallurgical work. It is important for domestic and industrial furnace use, and for the manufacture of water gas. For these purposes the fusing point shall not be below 2,200 deg. F. and for the manufacture of water gas it should preferably be higher than 2,300 deg. F.

Ash, Sulphur, Phosphorus. There are no general limitations on these constituents, but there are important special limitations as given below.

Special Specifications for Gas Coals

Volatile Matter. The volatile matter shall not be less than 35.0% on the dry ash-free basis. (This is equivalent to 30.8% for a coal containing 12.0% combined ash and moisture.)

Ash. The ash in the dry coal shall not be over 9%.

Sulphur. Sulphur in dry coke shall not be over 1.5% and the resultant gas shall not contain more than 30 grains of sulphur per 100 cu. ft., in the form of compounds other than hydrogen sulphide.

Quality of Coke. The coke produced must be of sufficient size and strength to be salable for domestic use or for the manufacture of water gas. These physical characteristics of coke are not amenable to simple explicit definition, and must necessarily be left to the judgment of experienced operators.

Special Specifications for Coking Coals.

Ash. The ash in the dry coal shall not be over 9%.

Sulphur. If foundry or metallurgical coke is to be produced, the sulphur in the

*As approved by Committee D-5 of the American Society for Testing Materials and the A. G. A. Committee on Gas Coal Specifications.

resultant dry coke shall not be over 1.0% for foundry coke, and not over 1.3% for blast furnace coke. Where gas is to be sold for domestic use, the sulphur in the coal must be in such combination and low enough in amount that sulphur compounds in the gas other than hydrogen sulphide shall not be over 30 grains per 100 cu. ft. of gas.

Phosphorus. A limitation on phosphorus may be required when coke is used for metallurgical purposes. It shall be subject to agreement.

Shrinkage. Coal which is to be charged into a by-product coke oven without admixture must yield a coke which shrinks sufficiently to permit its discharge from the oven without difficulty. The mixing of coals for by-product coke oven use is widely practiced, however, and such mixtures usually contain as a very important constituent, low volatile or "smokeless" coking coals which when carbonized alone, do not give the requisite shrinkage.

Quality of Coke. The coke produced must meet such requirements as to size, strength and structure, as are necessary for good practice in the industries which use it. These physical characteristics of coke are not amenable to simple explicit definition, and must necessarily be left to the judgment of experienced operators.

(Continued from page 370.)

Kidde & Co.
Minneapolis Heat Regulator Co.
Robertshaw Thermostat Co.
Ryan Co., B.
Schaeffer & Budenberg Mfg. Co.
Van Zandt Gas Appliance Co.
Wilson Co., H. A.

THORIUM
Welsbach Co.

TILE (Refractory)
American Gas Construction Co.
Gas Machinery Co.
Gautier & Co., J. H.
Improved Equipment Co.
Parker-Russell Mining & Mfg. Co.

TIPS
Industrial Burner
American Gas Furnace Co.
American Lava Corp.
Radiant Fire
Schmidt, G. F.
Stove
American Lava Corp.

TOASTERS
Crane Co., Wm. M.
Combustion Utilities Corp.
McClary Mfg. Co.
Roper Corp., Geo. D.
Wolff Gas Radiator Co., A. H.

TOOLS, PIPE (Caulking, Cutting, Tapping)
Grinnell Co. Inc.
Mueller Mfg. Co., H.
Safety Gas Main Stopper Co.
United Lead Co.

TRAPS, STEAM
Grinnell Co. Inc.
Johns-Manville Inc.
Schaeffer & Budenberg Mfg. Co.
Sturtevant Co., B. F.

TRENCH WORK
American Gas Construction Co.
Connelly Iron Sponge & Governor Co.
Safety Gas Main Stopper Co.

TUBING, FLEXIBLE (And Ends)
Atlantic Tubing Co.
Crane Co., Wm. M.
Eastman Mfg. Co.
Federal Tubing Co.
General Gas Light Co.
New York Gas Tubing Co.
Strause Gas Iron Co.
Titeflex Metal Hose Corp.
Welsbach Co.
Wheeling Corrugating Co.

TURBINE, STEAM
Sturtevant Co., B. F.

VACUUM CLEANERS
Sturtevant Co., B. F.

VALVES
Ajax Brass & Iron Co.
Bartlett Hayward Co.
Bryant Heater & Mfg. Co.
Claus Automatic Gas Cock Co.
Combustion Utilities Corp.
Connelly Iron Sponge & Governor Co.
Davis & Farnum Mfg. Co.
Detroit Brass & Malleable Works
Gas Machinery Co.
Grinnell Co. Inc.
Hays Mfg. Co.
Improved Equipment Co.
Isbell-Porter Co.
Johnson Gas Appliance Co.
Ludlow Valve Mfg. Co.
National Machine Works
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
Back Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Gas Engine
Claus Automatic Gas Cock Co.
Gate
Grinnell Co. Inc.
Ludlow Valve Mfg. Co.
National Machine Works
S O S Welding Corp.
Western Gas Construction Co.
Needle—for Gas Stoves
Acme Brass Works
Claus Automatic Gas Cock Co.
Detroit Brass & Malleable Works
General Gas Appliance Co.
Peninsular Brass Works
McRae & Roberts Co.

Roberts Brass Mfg. Co.
Schmidt, G. F.
Service
Grinnell Co. Inc.
Ludlow Valve Mfg. Co.
National Machine Works
Thermo
Bryant Heater Mfg. Co.
Claus Automatic Gas Cock Co.
Pittsburg Water Heater Co.
Robertshaw Thermostat Co.
Ryan Co., B.
Wilson Co., H. A.

VENTILATORS
Sturtevant Co., B. F.
Young Brothers Co.

WAFFLE IRONS
Crane Co., Wm. M.
McClary Mfg. Co.
Roper Corp., Geo. D.

WARMERS, PLATE
Combustion Utilities Corp.
Crane Co., Wm. M.
Duparquet, Huot & Moneuse Co.
General Gas Appliance Co.
McClary Mfg. Co.
Roper Corp., Geo. D.

WASHERS
American Gas Construction Co.
Bartlett Hayward Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Russell Engineering Co.
Western Gas Construction Co.
Air
Sturtevant Co., B. F.
Ammonia
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Isbell-Porter Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Water Gas
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

WATER HEATERS
A-B Stove Co.
American Radiator Co.
Baltimore Gas Appliance & Mfg. Co.
Bartlett & Co., Inc.
Bastian-Morley Co.
Bryant Heater & Mfg. Co.
Clark & Co. Div., Geo. M.
Cleveland Heater Co.
Crane Co., Wm. M.
Dangler Stove Co. Div.
Detroit Stove Works
Estate Stove Co.
General Gas Appliance Co.
Geyser Sales Co.
Hoffman Heater Co.
Holyoke Heater Co.
Humphrey Co. Div.
Kane Mfg. Co. Inc., Wm.
Kidde & Co.
Kompak Co.
Lawson Mfg. Co.
Lovekin Water Heater Co.
McClary Mfg. Co.
Michigan Stove Co.
National Stove Co. Div.
New Process Stove Co. Div.
Peerless Heater Co.
Peninsular Stove Co.
Philadelphia Stove Co.
Pittsburg Water Heater Co.
Quick Meal Stove Co. Div.
Rathbone, Sard & Co.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Ryan Co., B.
Ruud Mfg. Co.
Sands Mfg. Co.
Sexton Stove & Mfg. Co., S. B.
Trenkamp Stove & Mfg. Co.
Van Zandt Gas Appliance Co.
Wales Co.
Wolff Gas Radiator Co., A. H.
Gas Range
Baltimore Gas Appliance & Mfg. Co.
Cleveland Heater Co.
Crane Co., Wm. M.
Detroit Stove Works
Estate Stove Co.
General Gas Appliance Co.
Michigan Stove Co.
Roberts & Mander Stove Co.
Roper Corp., Geo. D.
Scott Gas Appliance Co.
Sexton Stove & Mfg. Co., S. B.
Wehrle Co.
Barbers
Crane Co., Wm. M.
Pittsburg Water Heater Co.
Bath
Hoffman Heater Co.
Humphrey Co. Div.
Pittsburg Water Heater Co.
Roper Corp., Geo. D.
Tappan Stove Co.

WELDING
American Gas Furnace Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Grinnell Co. Inc.
National Machine Works
Riter-Conley Co.
Sexton Stove & Mfg. Co., S. B.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Union Steel Products Co. Ltd.
Western Gas Construction Co.
Young Brothers Co.

WIRE
Union Steel Products Co. Ltd.

YARN, CAULKING
Safety Gas Main Stopper Co.

Employment Bureau

SERVICES REQUIRED

WANTED—FOREMAN for Gas Department. High pressure distribution. Experienced in running extensions, services, regulators, meters, gas appliance installations, appliance maintenance, and complaint work. Permanent position in good locality in East. 3,000 services. State age, experience, salary expected and references. Address A. G. A.
Key No. 020.

WANTED—Superintendent Gas Department in an eastern gas and electric company with a send-out of approximately 25,000,000 cubic feet a year. A young technical graduate with some gas experience is preferred for this position. Address A. G. A.
Key No. 021.

WANTED—A progressive New England Gas Company selling annually 200 Automatic Water Heaters requires the services of a first class water heater salesman. Must be clean cut with personality and ability to sell consumers and plumbers. A good position for a good man. Give qualifications, age, experience, references and salary desired. Address A. G. A.
Key No. 012.

WANTED—Sales Engineer experienced in designing silica and fire clay Retort Benches and other furnaces. State experience and what acquaintance, if any, with the Gas Trade. Address A. G. A.
Key No. 013.

WANTED—We want a man of long experience on gas main and service work, particularly high pressure, setting and adjusting regulators, etc. State age, experience and salary desired. Address A. G. A.
Key No. 014.

CUSTOMER OWNERSHIP—Wanted, man experienced in customer ownership stock compaigns. Approximately 20,000 gas and electric consumers; about 90,000 population. Advise experience, salary desired, references, etc. Address A. G. A.
Key No. 016.

WANTED—A young technical graduate (about 22 to 27 years of age) for general Physical Testing and Research, by a large eastern gas company. Must have a good knowledge of general physics, particularly electrical measurements, and some gas works' experience. Should be able to plan and execute tests and research work, and prepare comprehensive reports thereon. An exclusively chemically educated man not wanted. Give full particulars in the first letter. Address A. G. A.
Key No. 015.

WANTED by a gas and electric company, young man to do office work who has had experience in ledger work, general routine work and especially on the complaint or service desk. In reply, please give outline of experience, references and salary expected. Address:
Key No. 022.

WANTED—Two Industrial Gas Salesmen for middle west city having an attractive gas rate. State experience, salary wanted. Address A. G. A.
Key No. 011.

A GAS COMPANY situated in a medium sized semi-foreign city desires a live Commercial Manager. Must be familiar with domestic and industrial appliances and competent to handle a New Business Department. In reply, please state age, education, languages spoken other than English, if any, whether married, experience and references. Address: A. G. A.
Key No. 024.

WANTED—College graduate, mechanical engineering, for position of cadet engineer in manufacturing plant of large gas company. Address: A. G. A.
Key No. 025.

SERVICES OFFERED

WANTED—Position by a man of large general experience in gas business who has made a special study of sales promotion problems, and who would prove valuable as an assistant to a busy executive in any department. Address A. G. A.
Key No. 134.

WANTED—Position of responsibility as Manager or Industrial Fuel Engineer—18 years varied experience in the gas business. References and service record furnished. Address A. G. A.
Key No. 142.

POSITION WANTED—By-Product, Coke-Oven Executive seeks more responsible connection. Fitted for Chief Chemical Engineer. Assistant-Superintendent or Assistant to Manager. University Graduate. Alexander Hamilton Institute Graduate. Nearly seven years with present 3000 ton plant. Thirty-two years old. Married. Address A. G. A.
Key No. 151.

YOUNG MAN 27 years of age, seven years' experience with president of combination gas, electric, and street railway property, town of 40,000 people, desires new connection. Thoroughly experienced in the handling of correspondence and the compilation of financial, statistical and operating reports and statements, as well as the general work in connection with public utility corporations. Address A. G. A.
Key No. 153.

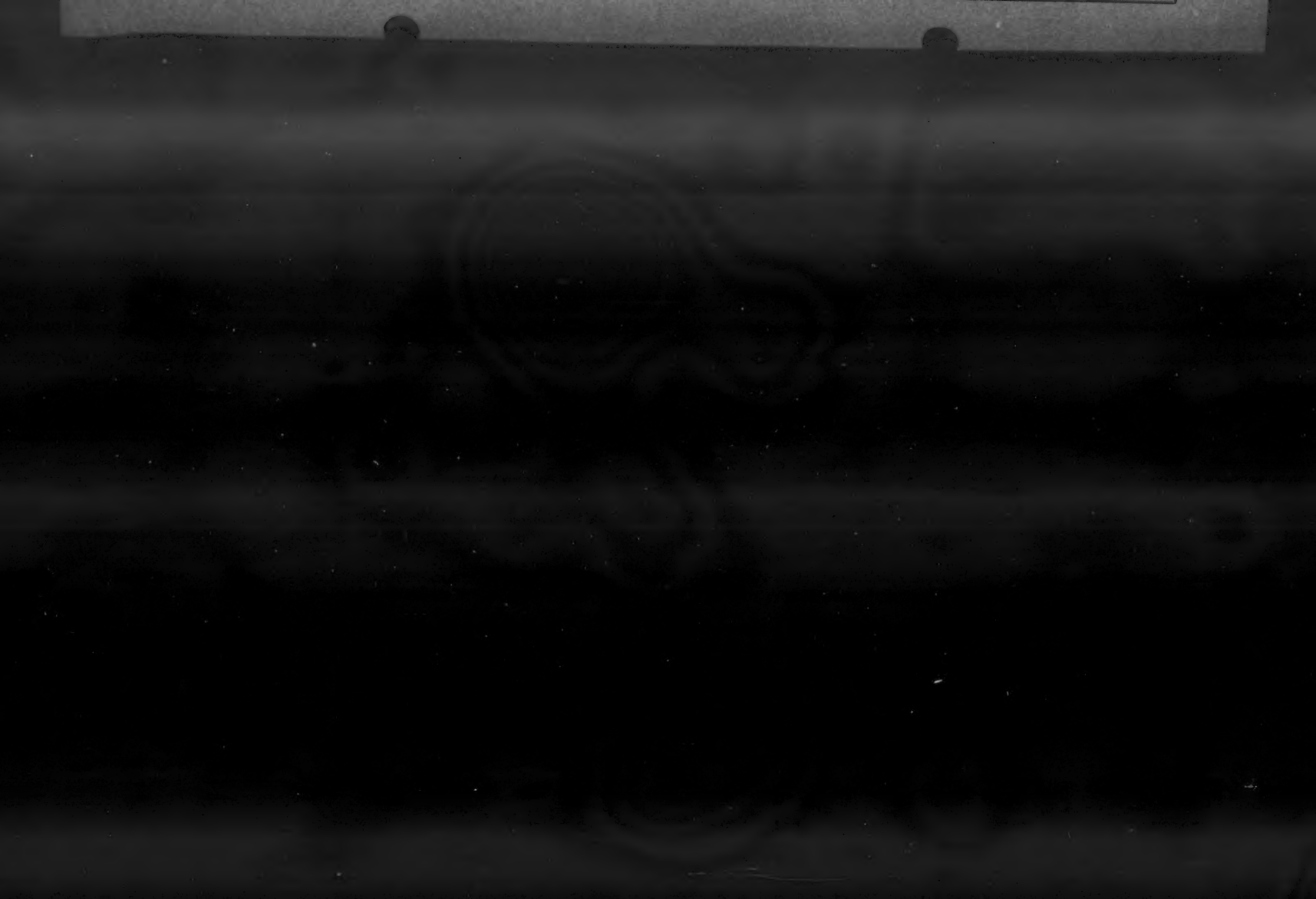
WANTED—Am open for a position of greater responsibility. At present manager of gas company in city of over 5000 gas consumers. Experience consists of four years as manager and eleven years in operating, construction and distribution. Age 39, married. Address A. G. A.
Key No. 157.

WANTED—Plant or General Superintendent position wanted by married man, who has grown up in the gas business, and worked through the manufacturing and distribution departments to General Superintendent of plant of 1,000,000 cubic feet per day capacity. Thirteen years with last company. Coal and water gas manufacture and high and low pressure distribution. College graduate. Address A. G. A.
Key No. 155.

WANTED—Experienced gas man would connect with a going company in managerial capacity. Can report with reasonable notice. No choice as to location. Address A. G. A.
Key No. 156.

WANTED—Position as manager of small gas plant (about 10,000 meters) or sales manager of larger plant. Can furnish the very best reference.
Key No. 158.

ENG.-SUPT. of one of the largest gas plants in the country would consider change. Desires to locate with company in which opportunities for future advancement are better than in present position. Is a married man. Has technical University training. No particular preference as to location. Address A. G. A.
Key No. 159.



Advisory Council

GEO. S. BARROWS ..... Providence, R. I.
W. H. BARTHOLD ..... New York, N. Y.
S. T. BODINE ..... Philadelphia, Pa.
NICHOLAS F. BRADY ..... New York, N. Y.
A. P. BRILL ..... Pittsburgh, Pa.
JOHN A. BRITTON ..... San Francisco, Cal.
HOWARD BRUCE ..... Baltimore, Md.
C. N. CHUBB ..... Davenport, Iowa
CHAS. M. COHN ..... Baltimore, Md.
R. C. CONGDON ..... Atlanta, Ga.
RUFUS C. DAWES ..... Chicago, Ill.
E. S. DICKEY ..... Baltimore, Md.
HALFORD ERICKSON ..... Louisville, Ky.
W. GRIFFIN GREBEL ..... Philadelphia, Pa.
EWALD HAASE ..... Milwaukee, Wisc.
R. B. HARPER ..... Chicago, Ill.
A. A. HIGGINS ..... Providence, R. I.
SAMUEL INSULL ..... Chicago, Ill.
A. P. LATHROP ..... New York, N. Y.
SIDNEY MASON ..... Gloucester, N. J.
T. N. McCARTER ..... Newark, N. J.
H. A. NORTON ..... Boston, Mass.
W. H. PETTES ..... Newark, N. J.
A. P. POST ..... Philadelphia, Pa.
J. L. RICHARDS ..... Boston, Mass.
M. C. ROBBINS ..... New York, N. Y.
GEO. D. ROPER ..... Rockford, Ill.
H. D. SCHALL ..... Detroit, Mich.
GEO. WILLIAMS ..... New York, N. Y.
E. N. WRIGHTINGTON ..... Boston, Mass.

AMERICAN GAS ASSOCIATION, INC.

HEADQUARTERS: 342 MADISON AVE., NEW YORK, N. Y.

Officers and Directors

PRESIDENT	R. B. BROWN	Milwaukee, Wis.
VICE-PRESIDENT	J. B. KLUMPP	Philadelphia, Pa.
SECRETARY-MANAGER	OSCAR H. FOGG	New York, N. Y.
TREASURER	H. M. BRUNDAGE	New York, N. Y.
ASS'T TREASURER	W. CULLEN MORRIS	New York, N. Y.
SECTIONAL VICE-PRES.	F. C. WEBER	New York, N. Y.
SECTIONAL VICE-PRES.	Wm. GOULD	Boston, Mass.
SECTIONAL VICE-PRES.	F. A. LEMKE	Kalamazoo, Mich.
SECTIONAL VICE-PRES.	J. W. HEINS	Philadelphia, Pa.
SECTIONAL VICE-PRES.	B. J. MULLANEY	Chicago, Ill.

D. D. BARNUM	Boston, Mass.
GEO. B. CORTELYOU	New York, N. Y.
Wm. M. CRANE	New York, N. Y.
MARTIN B. DALY	Cleveland, Ohio
S. E. Du FRESE	Rome, Ga.
J. S. Du HART, Jr.	Newark, N. J.
CHAS. H. DICKEY	New York, N. Y.
H. L. DOHERTY	New York, N. Y.
L. R. DUTTON	Jenkintown, N. Y.
P. H. GADSDEN	Philadelphia, Pa.
ARTHUR HEWITT	Toronto, Can.
C. L. HOLMAN	St. Louis, Mo.
F. H. KNAPP	Pittsburgh, Pa.
A. B. MACBETH	Los Angeles, Cal.
CHARLES A. MUNROE	Chicago, Ill.
H. S. REESIDE	Washington, D. C.
H. S. SCHUTT	Philadelphia, Pa.

Section Officers

ACCOUNTING—Chairman	J. W. HEINS	Philadelphia, Pa.
Vice-Chairman	W. A. SAUER	Chicago, Ill.
Secretary	H. W. HARTMAN	Ass'n Headqtrs.
ADVERTISING—Chairman	B. J. MULLANEY	Chicago, Ill.
Vice-Chairman	J. M. BENNETT	Philadelphia, Pa.
Secretary	C. W. PERSON	Ass'n Headqtrs.
COMMERCIAL—Chairman	Wm. GOULD	Boston, Mass.
Vice-Chairman	J. E. DAVIES	Chicago, Ill.
Secretary	LOUIS STOTZ	Ass'n Headqtrs.
MANUFACTURERS—Chairman	F. A. LEMKE	Kalamazoo, Mich.
Vice-Chairman	G. W. PARKER	St. Louis, Mo.
Secretary	C. W. BERGHORN, Jr.	Ass'n Headqtrs.
TECHNICAL—Chairman	F. C. WEBER	New York, N. Y.
Vice-Chairman	H. C. WEHNERT	St. Louis, Mo.
Secretary	H. W. HARTMAN	Ass'n Headqtrs.

SECRETARY-MANAGER	OSCAR H. FOGG	Ass'n Headqtrs.
ASS'T SECRETARY-MANAGER	LOUIS STOTZ	Ass'n Headqtrs.
ASS'T SECRETARY-MANAGER	N. T. SELLMAN	Ass'n Headqtrs.